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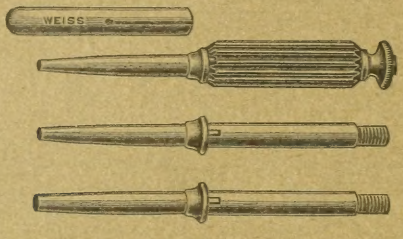

Mr. SYDNEY STEPHENSON (London)[1] writes[2]: It seems probable that the sclera will be more often trephined for the relief of glaucoma in the future than it has been in the past. The operation may be undertaken either with the complicated instrument of von Hippel or with the simpler instrument of Sir William Bowman. In employing the last-named there are certain drawbacks, one of the most important of which is the difficulty of holding the trephine securely. This was recognised by Argyll Robertson many years ago, and it induced him to devise a trephine provided with a handle. With the help of Messrs. John Weiss and Son, Limited, I have carried Robertson's idea a step further. The new instrument is made from solid steel and drilled. It carries a collar bearing a pin, which fits into the slot of the pinion-wire handle, and thereby prevents the latter from rotating. The handle is fixed by a nut, which screws on to the proximal end. The blades of the trephine are 1 mm., 1.5mm. and 2mm. diameter respectively, and, as shown by the illustration, each blade is furnished with a cap for its protection. One handle serves for the three blades. The whole set can be fitted into a neat metal case at a slightly increased cost. If only one trephine be required it can be supplied with a fixed handle.

"THE OPHTHALMOSCOPE," *June*, 1910.

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THE

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ORIGINAL COMMUNICATIONS

THE FILTRATION ANGLE : THE ANATOMY AND FUNCTION OF ITS PARTS, TOGETHER WITH CERTAIN SUGGESTIONS BEARING ON THEIR ASSOCIATION WITH THE PRODUCTION OF GLAUCOMA.

BY

ARTHUR THOMSON, M.A., M.B., F.R.C.S.,

PROFESSOR OF HUMAN ANATOMY IN THE UNIVERSITY OF OXFORD.

IN a recent communication published in this journal[1], I drew attention to certain features in the anatomy of the filtration angle, which appeared to me important in association with the functions attributed to this part of the anterior chamber. Among these I laid stress on the fact that appearances seemed to justify the assumption that the character of the angle varied with the condition of the iris, in other words, that the trabecular tissue corresponding to the structure known as the pectinate ligament was stretched in such a manner as to round off the angle when the pupil was contracted, whilst, when the pupil was dilated, the same tissue by its resiliency was withdrawn against the outer wall of the angle, thus emphasising the depth of the *sulcus circularis corneæ*. I also threw out the suggestion that in some way the movements of the iris might exercise an influence on the interchange of the fluid contained in the anterior chamber and that circulating in the system of Schlemm.

With the view of ascertaining whether additional evidence could be obtained in support of this theory, I have made a more detailed and minute examination of the structures involved, and it is the results of this enquiry that I now propose to submit for consideration and criticism.

As has been pointed out by Nagel[2] in his Text-book of Physiology, any theory of filtration involves some special mechanism to overcome the influence of external pressure on the walls of the veins and capillaries involved, for if the pressure on the vessels from without be greater than the pressure within, then the natural tendency will be for the walls of the vessels to be forced together and so lead to the collapse of their lumen. So long, says he, as the mechanical means employed to this end are not made clear, we must suppose that forces other than the influence of pressure alone are at work to bring about the removal of the aqueous humour. It is in the hope of overcoming this difficulty and of shedding light on what appears to me a very beautiful structural provision for this purpose, that I venture to submit for consideration the following facts and observations.

Without entering into a detailed histological analysis of the parts about the so-called "filtration angle," there are some facts concerning the minute anatomy of this region which require more careful consideration than is ordinarily given to them.

The radial fibres of the ciliary muscle, so far as I have been able to ascertain, are generally described as taking their *fixed* point from the sclerotic near the sclero-corneal junction, any influence produced by the contraction of

1. "The Gross Anatomy of the Filtration Angle of the Human Eye." THE OPHTHALMOSCOPE, September, 1910.

2. *Physiologie des Menschen*, Bd. III, Braunschweig, 1905.

the muscle being exercised in drawing forwards the orbiculus and ciliary processes. Tscherning alone takes exception to this view, holding, in accordance with his theory of accommodation, that the posterior attachment of the meridional fibres is more fixed than the anterior, and that these latter pull on the suspensory ligament of the lens, rendering it more tense.

Passing to the consideration of the anterior scleral attachment of the ciliary muscle, we find a remarkable peculiarity in its arrangement. As has been described by others, the meridional fibres of the muscle arise from a projecting rim of scleral tissue immediately to the outer side of the iridial angle. When the eye is cut meridionally this rim appears in section as a small triangular area of condensed scleral tissue, the so-called scleral process or spur (*Calcar sclerœ*). The oblique base of this process is confluent with the inner surface of the sclera immediately to the outer side of the filtration angle. Its apex points forwards and inwards towards the outer wall of the iridial angle; to its anterior sloping margin are attached the bundles of the trabecular tissue of the pectinate ligament, formed by the splitting up of Descemet's membrane, whilst from its posterior edge arise the meridional fibres of the ciliary muscle (see fig. 1). What strikes one as remarkable is that if this process is to be regarded as a fixed point, one would naturally expect it to be drawn out and tapered in the direction in which the muscle habitually pulls, that is backwards and outwards; whereas, directed as it is, forwards and inwards, the disposition of the process obviously suggests that when the muscle contracts, the spur will be drawn backwards in lever-like fashion, just as one would pull open a door. A diagrammatic representation of the arrangement based on the examination of a considerable number of specimens is here supplied, fig. 2. The black

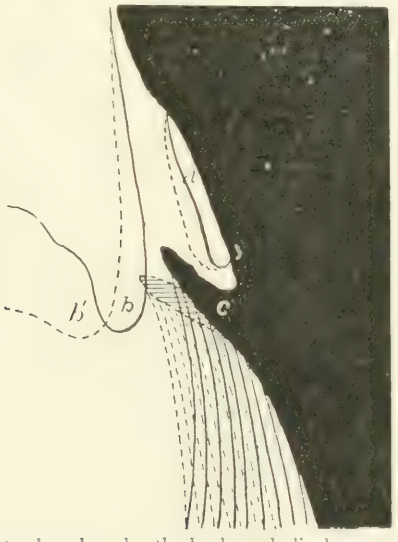

Fig. 2. A diagram to shew how by the backward displacement of the scleral process induced by the action of the ciliary muscle the lumen of Schlemm's canal is enlarged.

a. Schlemm's canal.

b. The iridial angle when the ciliary muscle is relaxed and the scleral process is drawn forward by the elasticity of the pectinate ligament.

c. The scleral process or spur with the pectinate ligament attached in front and the ciliary muscle behind.

The solid outline is intended to represent the parts when the muscle is inactive. Under these conditions, for the sake of clearness, the canal of Schlemm is represented as open, though much narrower than when the ciliary muscle is contracted, as indicated by the dotted lines.

outline represents the appearance of the parts when the muscle is not contracted, the dotted outline is an attempt to illustrate what takes place when the muscle is in action.

If this be the case, and I hope in the course of the paper to furnish adequate evidence that it is so, then the anterior extremity of the ciliary muscle can, in no sense, be regarded as a fixed point, for here by the action of the muscle, it is evident that a modification in the relations and arrangements of the parts can be induced, which I hope to show will be of the greatest importance in connection with the passage of fluid out of the anterior chamber. In order to appreciate the value of the changes here induced by the contraction of the ciliary muscle, it will be necessary to describe in some detail the other structural arrangements around the iridial or filtration angle.

At the internal sclero-corneal junction, which, as shown in my former paper, corresponds to the deepest part of the *sulcus circularis corneæ*, produced by the overhang of the thickened internal circumference of the cornea, Descemet's membrane, with its overlying endothelial layer, suddenly undergoes a change ; in thin, microscopical preparations, the point at which this alteration in its structure takes place is marked by the presence of the kink, to which I have previously drawn attention.[1]

The nature of the change is such as to lead to the breaking up of the compact homogeneous elastic layer of Descemet into a number of fibrillæ arranged in brush-like fashion, in this way a triangular area of trabecular tissue is formed, the so-called pectinate ligament. There is clear evidence, from the stained specimens I have examined, that the spaces within this tissue are lined by extensions from the layer of endothelial cells covering the posterior surface of Descemet's membrane.

Now, this field of trabecular tissue intervenes between the denser scleral tissue externally and the outer wall of the iridial angle internally. The summit of this triangular area corresponds to Decemet's membrane at the internal sclero-corneal junction, its base is incised by the summit of the scleral spur, in such a way as that many of its fibres are attached to the anterior and external surface of that process, whilst internally some of its fibres sweep backwards past the projecting summit of the scleral spur and become continuous with the tissue of the iris lying internal to the meridional fibres of the ciliary muscle, and establishing a connection with the area occupied by the circular fibres of that muscle.

Around the bottom of the iridial angle the fibres which pass to the substance of the iris display in well-stained specimens a direct continuity with the muscular radial fibres of the iris (see fig. 1).

In suitably stained preparations I have not been able to trace the meridional fibres of the ciliary muscle passing forwards internally over the extremity of the scleral spur, as has been described by others, although the appearance in sections, not subjected to a differential stain, would appear to warrant such a description.

Of the sides of this triangular mass of trabecular tissue, the inner edge forms the outer wall of the iridial angle, and becomes continuous with the anterior endothelium covering the iris around the lower limit of the angle. The outer side of the trabecular mass is applied to the inner surface of the sclera, immediately posterior to the internal sclero-corneal junction, extending as far back as the inspring of the scleral spur, a distance which, on the average, measures 0.6 mm. But here, separating the two tissues, is the canal of Schlemm, represented in section as an endothelial-lined cleft, usually empty,

1. THE OPHTHALMOSCOPE, September, 1910

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ARTHUR THOMSON, M.A., M.B., F.R.C.S.

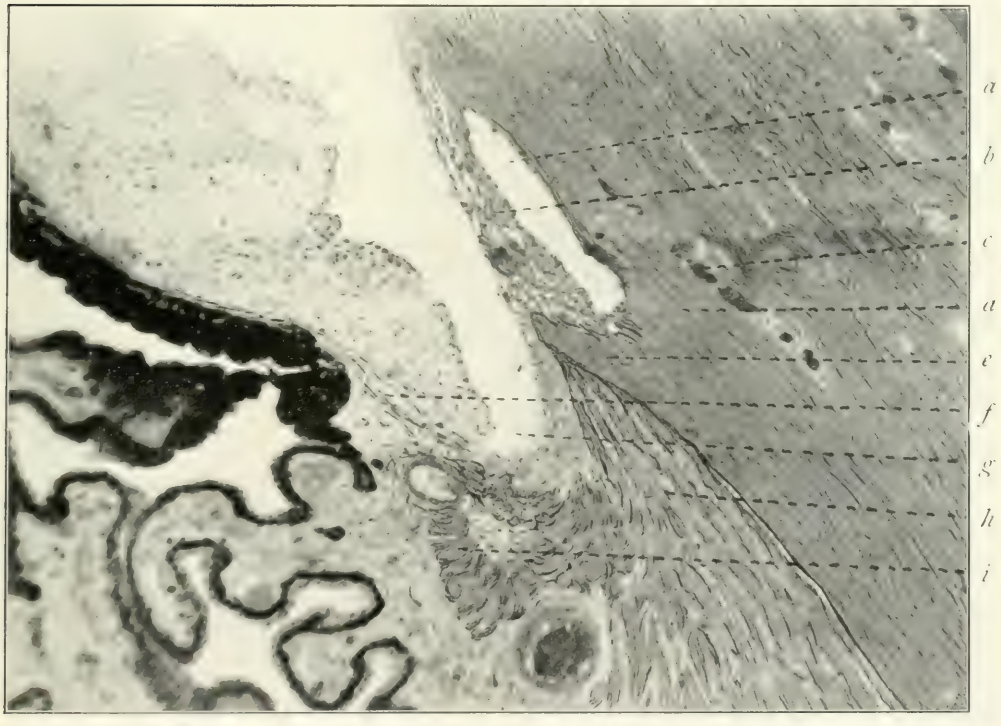


Fig. 1. Enlarged general view of the iridial angle.

a. Canal of Schlemm.
b Trabecular tissue of pectinate ligament.
c. Scleral vein.
d. Dense scleral tissue.
e. Scleral process or spur projecting inwards and forwards from the sclera close behind the canal of Schlemm.
f. Radial muscular fibres of the iris extending outwards below the iridial angle.
g. Iridial angle.
h. Meridional fibres of the ciliary muscle.
i. Circular fibres of the ciliary muscle.

The microphotograph has been slightly touched up so as to emphasise the differentiation of tissue which is revealed by the Malory stain.

but occasionally containing a few red blood corpuscles. The outer wall of this channel corresponds to the inner surface of the dense and compact scleral tissue, whilst its inner wall is formed by the external aspect of the less dense trabecular area; put in another way, the outer wall of the canal of Schlemm is more or less rigid, whilst its inner wall is subjected to the influence of any traction exerted on the highly elastic trabecular tissue.

As to the walls of this canal, my observations agree with those of Rochon-Duvigneaud[1] in that they consist merely of an endothelial lining resting immediately on the surrounding tissue and not provided with any other definite wall.

It is not material to the subject of this paper to discuss whether the canal of Schlemm is to be regarded as a lymph channel or as an annexe of the venous system. It is a matter of common knowledge that it does not usually contain blood, the explanation offered being that the intra-ocular pressure does not immediately fall at death and that consequently there is sufficient pressure to drive out the blood into the adjacent veins. On the other hand, that blood can penetrate into the canal of Schlemm is undoubted—the researches of Iwanoff and Rolleti[2] prove this. In the cases recorded by them, however, we have no information to prove or to disprove that this condition was not accompanied by a fall in the intra-ocular tension. I can myself confirm the statement that blood may and does enter the canal of Schlemm, since I have seen undoubted evidence of the presence of red blood corpuscles within its lumen.

In the foregoing description of the parts around the iridial angle it has been assumed that the meridional fibres of the ciliary muscle do not pass forwards beyond the scleral spur, but are limited in their attachment to the internal or posterior surface of that process. Such an assumption, however, cannot pass without further investigation, particularly in view of the statements made by Schwalbe, Leber, Küschel, and Nicolai, that some of the fibres of the ciliary muscle pass through the pectinate ligament to be attached to the inner wall of the canal of Schlemm, and in this way may possibly exercise an influence on the lumen of that vessel. Personally, I have not been able to confirm these observations; the use of such a differential stain as that of van Giesen is not, in my experience, always reliable, and the results obtained are apt to vary considerably according to the conditions under which the stain is applied, but, even allowing for this, I have not been able to satisfy myself that it was possible to trace any of the fibres of the ciliary muscle in front of the scleral spur. In this, I am confirmed by the use of another stain, *viz.*, that recommended by Malory.[3] Unfortunately the application of this stain was not in all cases possible, since it acts to the best advantage only in specimens which have been prepared in Zenker's fluid, and fails to give good results in formaline hardened preparations. For this reason its use was inapplicable in much of our material; in the cases, however, where we had employed Zenker's fluid as a fixing agent, the results obtained were of the most convincing kind. The first specimen stained according to this method I received from Dr. E. J. Curran, of Harvard University, and I confess the differentiation of tissue exhibited by it was a revelation to me. Since then I have employed it with much advantage, and find it much more reliable and satisfactory than van Giesen. In specimens so prepared the muscular elements stain a bright carmine in contrast with the connective tissue elements which colour a brilliant

1. *Archiv. d'Opht.*, Paris 1892, T. XII, XIII.
2. *Archiv f. Ophth.*, 1896, Bd. XV, S. 54.
3. *The Journal of Experimental Medicine*, 1900, Vol. V, p. 15.

blue. The endothelium lining the inner surface of Descemet's membrane also stains bright red, so that it can readily be differentiated from the underlying membrane itself. Further, when Descemet's membrane splits up to form the trabecular tissue of the pectinate ligament, the extension of these endothelial cells to line the spaces within the tissue is very clearly demonstrated. The endothelium lining the canal of Schlemm is also similarly stained, as is also the endothelium of the adjacent veins. In no case, however, have I been able to trace any of the fibres of the ciliary muscle forwards over the scleral spur to reach the inner wall of Schlemm's canal through the substance of the pectinate ligament. Further, as the researches of Kiribucki[1] and Seefelder[2] conclusively prove, elastic tissue enters largely into the composition of this trabecular tissue, an observation which I have confirmed by the examination of Weigert-stained specimens. It will thus be seen that the scleral spur is intermediate in position between a contractile tissue posteriorly, and an elastic tissue anteriorly ; or, expressed in another way, that whilst the meridional fibres of the ciliary muscle by their contraction can pull the spur backwards and inwards, the elastic tissue attached to its anterior surface will by its resiliency tend to counteract this and pull it forwards and outwards again.

We are thus provided with an admirable arrangement whereby the lumen of Schlemm's canal can be modified under different conditions

There are three muscles which may exercise an influence on the position of the scleral spur, pulling it backwards and inwards ; these are the meridional and circular fibres of the ciliary muscle, and the sphincter muscle of the pupil. The former act in accommodation, and in their action are usually associated with contraction of the pupil. The resultant of the combined action of these muscles is such as to draw the scleral spur backwards, and owing to its lever-like connection with the inner surface of the sclera also inwards, with the consequent result that the fibres of the pectinate ligament which are attached, as has been described, to the anterior surface of the scleral spur are put on the stretch. Further, in consequence of the intimate connection of the fibres of the pectinate ligament with the inner wall of Schlemm's canal, of which, in fact, they form the inner wall, it follows that that wall is forcibly pulled inwards, and the lumen of Schlemm's canal is thereby increased. In this way a negative pressure is established within the canal into which fluids will pass along the line of least resistance. When the muscles afore-mentioned cease to contract, the pectinate ligament by its inherent elasticity pulls the scleral spur forwards and outward again, thus mechanically affecting the collapse of the inner wall of the canal of Schlemm against its outer wall, and so restoring it to the ordinary influences of the intraocular pressure.

That this influence on the lumen of Schlemm's canal is due to the action of the ciliary muscle is confirmed by the figures published by Heine[3] in illustration of his paper, and also referred to in the text, from which it appears that under the influence of eserine Schlemm's canal is opened up ; whilst in an eye which has been treated with atropine the canal is more or less collapsed. The figures are reproduced in Nagel's "*Physiologie des Menschen*," Bd. III, p. 33. Unfortunately, the originals are lithographic drawings and not direct photographs, which somewhat detracts from their value.

In support of the soundness of this conclusion I would advance this further proof, which in several specimens I have been able to verify. If a meridional

1. *Archiv f. Augenheilkunde*, Bd. XXXVIII, 1899.
2. *Archiv f. Ophthalmologie*, Bd. LXXIII, 1910, S. 188.
3. *Archiv f. Ophthalmologie*, Bd. XLIX, S. 1.

section of the globe of a normal eye, with a fairly dilated pupil be taken, the position of the canal of Schlemm is with difficulty made out; but if under a dissecting microscope gentle traction be made on the iris and on the ciliary body in a direction similar to the resultant of the forces exercised by the the muscles contained therein, the position of the canal of Schlemm at once becomes apparent owing to the fact that it is opened up and appears as a narrow cleft; on withdrawing this mechanical strain on the structures concerned, however, the cleft at once disappears, owing to the elasticity of the tissues, and the parts again resume their normal appearance in which it is difficult to make out the position of the canal. The experiment is no doubt crude, but at the same time suggestive, and if the facts be admitted, as observed, we have additional support given to the views already advanced from a consideration of the arrangement of the details of the anatomical structures involved.

A further consideration may here be mentioned. The scleral process or spur as displayed in meridional section is, of course, but the section of a sloping wedge-shaped rim projecting from the internal scleral surface. It follows from this, that its internal circumference will be less than its attached circumference. But when, by the action of the ciliary muscle, the internal circumference is drawn backwards and inwards so as to occupy a position in which the internal circumference is still further reduced, there will be an inherent tendency for the fibro-elastic tissue, of which the rim is composed, to return to the position of rest when the ciliary muscle ceases to act, in this way co-operating with the elastic traction exercised through the pectinate ligament. On these grounds it seems reasonable to assume that we have an extremely ingenious mechanical device for regulating the lumen of the canal of Schlemm. By the contraction of the ciliary muscle and the sphincter of the pupil, the lumen of the canal may be increased by the mechanical separation of its walls. By the action of the elastic fibres of the pectinate ligament, the lumen of the canal is at once reduced on the withdrawal of the traction exercised by the muscles. What takes place is closely analagous to what happens when we pull open a door which is closed again by the elasticity of an india-rubber band.

If this be so, much of the difficulty which is at present experienced in accepting any theory of filtration taking place in this situation at once disappears, for this arrangement fulfils the conditions laid down by Nagel in the passage quoted earlier in this paper (see p. 470), *viz.*, that some special mechanism is required to overcome the influence of external pressure on the walls of the vessels. As has been explained, this is effected by the combined action of the muscles pulling open the lumen of the canal and thereby establishing a negative pressure within, but this action must be an *interrupted action*, otherwise, as will be seen later, equilibrium is soon re-established and no benefit results. To counteract this effect, we have the advantage of the influence of the elastic pectinate ligament to restore the lumen of the canal to what may be termed the position of rest.

The induction of a negative pressure within the canal of Schlemm will naturally lead to the accumulation of fluid within it along the channels of least resistance. What these are must next be considered.

The researches of Gutman[1], Schwalbe[2], Leber[3], and others have proved conclusively that it is possible to inject the canal of Schlemm from the anterior chamber, and so on into the surrounding veins.

1. *Archiv f. Ophth.*, Bd. XLI, 1895.
2. *Lehrbuch der Anatomies des Sinnes Organs*, 1887.
3. *Archiv f. Ophthal.*, Bd. XLI, 1895.

More recently Nuel and Benoit[1] have investigated the same subject. Their conclusions, based on the injection of Chinese ink into the living eye, both animal and human, have enabled them to demonstrate the paths of elimination of this fluid from the anterior chamber. According to their view, about one-third of the aqueous fluid is drained away from the anterior chamber through interstitial spaces within the iris, opening by stomata in the region of the iridial angle, and also by orifices on the anterior surface of the iris near the pupillary margin. The further passage of the pigment granules which had invaded these channels appeared to be blocked when they came in contact with the walls of the small veins, thus indicating the direction in which the stream flowed. This flow, the authors think, is determined by the difference in pressure between the intra-ocular tension and the circulation in the capillaries. They do not seem to have considered the possibility of the contractions of the iris itself being a motive force.

These investigators admit, however, that the bulk of the aqueous humour drains away from the anterior chamber through the region of th e iridial angle. They found the interstices of the pectinate ligament filled with pigment granules, but they never saw the same granules free within the canal of Schlemm or in the perforating veins, from which they concluded that there were no direct channels of communication between the canal of Schlemm and the spaces (spaces of Fontana) within the trabecular tissue of the pectinate ligament.

On the other hand, Leber[2] admits that whilst he was able readily to inject the canal of Schlemn from the scleral veins, he failed to force the injection into the spaces within the trabecular tissue (spaces of Fontana) or into the anterior chamber.

As the result of these observations, it seems clear that whilst fluids may pass freely from the anterior chamber into the canal of Schlemn and so onwards into the surrounding veins, it is highly improbable that under ordinary conditions that fluid once having entered the canal of Schlemm can return from that canal into the aqueous chamber.

The intimate connection of the canal of Schlemm with the venous system has been admirably demonstrated by T. Henderson[3] by means of reconstruction methods. It is not however clear on what grounds he assumes that some of these channels are efferent, whilst others he describes as afferent to the canal. The assumption that some of the communications with the adjoining veins are afferent to the canal is more or less dependent on his suggestion that "Having already passed through one set of capillaries, the blood pressure in the afferent veins of Schlemm's canal, and therefore of Schlemm's canal itself must be less—just slightly less—than that in the original capillary venous areas of the iris and ciliary bodies."

In this connection the reader may be reminded that the observations of Schwalbe[4] led him to conclude that under normal conditions the lumen of these channels is so small as to hinder the entrance of blood into the canal of Schlemm, since there are other and more open vessels through which the stream may drain away. As has been said, the canal of Schlemm does not ordinarily contain blood; it usually contains fluid similar to that in the anterior chamber.

As proved experimentally, coloured injections may be passed into it from the anterior chamber, but a more convincing proof of this is forthcoming

1. *Archiv f. Ophth.*, Bd. XLI, 1895.
2. *Archives d'Ophtalmologie*, T. XX, 1900, p. 161.
3. THE OPHTHALMOSCOPE, Vol. VI, No. 10, p. 758.
4. *Anatomie des Auges*, S. 176 (*also Norris*, p. 254).

Fig. 3. An enlarged view of a natural injection of the channels around the iridial angle in a case of retinal hæmorrhage.

Note how the spaces within the trabecular tissue of the pectinate ligament are blocked with pigment and broken-down blood corpuscles, which have also invaded and filled Schlemm's canal. In this section the scleral process is well displayed.

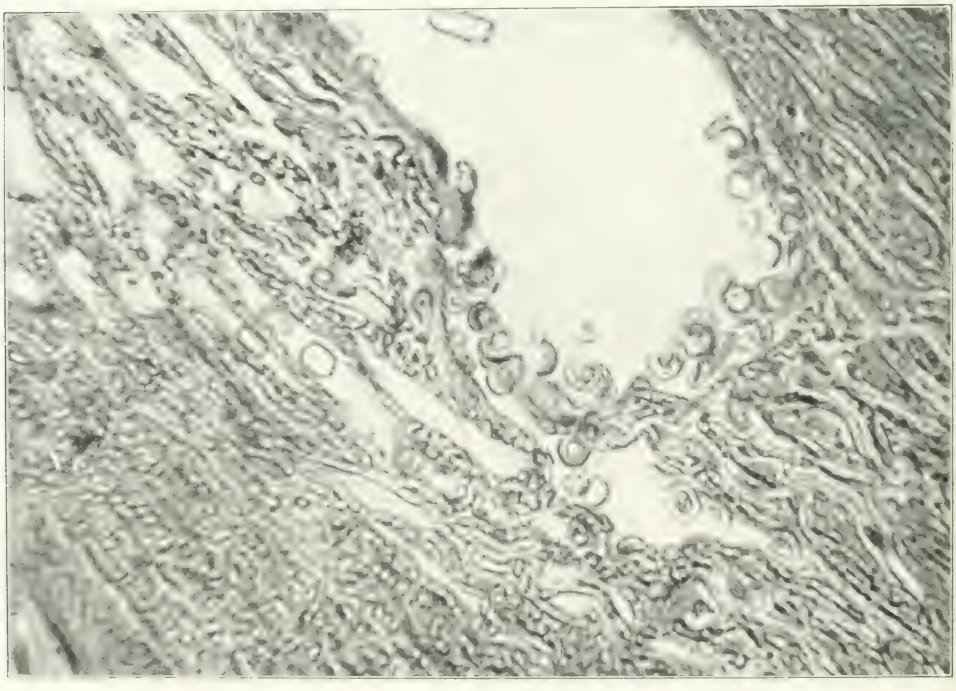


Fig. 4. A section passing through the trabecular tissue of the pectinate ligament and the posterior circumference of Schlemm's canal. Within the canal a number red blood corpuscles are seen clinging to its walls; to the left of the canal four blood corpuscles may be seen lying in channels within the trabecular ligament. The path by which these corpuscles have left the canal of Schlemm is shown in the section near the lower and left-hand side of the canal where some of the corpuscles have been arrested in their passage through a channel which is there displayed.

in these particular cases in which the contents of the anterior chamber have undergone a change in the nature of their constituents, as the result of some pathological condition. The specimen, which is here reproduced (fig. 3), from a case of retinal hæmorrhage exhibits in a convincing manner, a natural injection of the parts around the iridial angle. The fluid in the anterior chamber contains a large number of blood corpuscles. These have been carried into the recesses of the pectinate ligament, and so onwards into the canal of Schlemm. The same may be seen in the crypts at the chorioidal attachment of the iris, and also in the in the interspaces between the bundles of the ciliary muscle. The whole of these lymph spaces have become choked with broken-down blood corpuscles and pigment, and in consequence blocked, with the result that an attack of acute glaucoma supervened and necessitated the removal of the eye.

The present value of the specimen, however, depends on the admirable illustration it gives of the freedom of communication between these lymph spaces and the canal of Schlemm, for in the illustration here given, not only is the general distribution of the blood granules and pigment such as has been described and figured by Nuel and Benoit shown, but an enlarged view of the same specimen (fig. 4) clearly demonstrates that the inner and more particularly the hinder wall of the canal of Schlemm is in free communication with the interstitial spaces of the pectinate ligament. Lest there should be any doubt about this I have had reproduced another highly magnified view of a portion of Schlemm's canal and the pectinate ligament. The preparation was taken from an eye removed for sarcoma of the limbus, and so far as the region of the iridial angle is concerned may be regarded as normal. What is of interest in this specimen is that red blood corpuscles were found here and there scattered throughout the interspaces of the pectinate ligament. How did they come there? They did not come from the anterior chamber, for, so far as could be seen, that was healthy and contained no blood. An inspection of Schlemm's canal proved that, though to all appearance devoid of blood, there were a number of red corpuscles within it, mostly adhering to its walls: a more careful examination of the specimen revealed the fact that near the posterior extremity of the canal, as shown in meridional section, there was a narrow opening displayed, communicating with the interstitial spaces of the pectinate ligament, and through this opening red corpuscles had been arrested in their passage from one region to the other. The inference in this case is that these corpuscles were passing from the canal of Schlemm towards the interstices of the pectinate ligament, if so, they seem to demonstrate the existence of a fairly free communication under certain conditions between the lumen of the canal and the spaces of Fontana, the corpuscles having apparently been washed out of the canal by a backward swing of the fluid contained in the canal, which, be it noticed, does not contain blood but only a few red corpuscles. Under ordinary circumstances this back flow must be checked by the collapse of the pectinate ligament, due to its inherent elasticity, but possibly in this particular instance the action was slower than normal and permitted a slight return of the fluid and the matter suspended in it towards the anterior chamber.

This preparation is also highly suggestive, since it seems to afford a hint of the manner in which a valve-like action may be brought to bear on the channels connecting the canal of Schlemm and the interspaces of the pectinate ligament. These latter appear as a series of channels parallel to the inner wall of Schlemm's canal: posteriorly, as displayed in fig. 4, they bend round to enter the posterior edge of the canal, but be it noted that since this arrangement of vessels lies within the receding angle formed by the anterior

edge of the scleral spur and the inner surface of the sclera itself, it follows, therefore, that when the scleral spur is pulled inwards by the action of the ciliary muscle, these channels will be uncurved and somewhat straightened, so as to render more easy the flow of fluid through them, when, however, on the relaxation of the muscular contraction the scleral spur is pulled forwards again by the elasticity of the pectinate ligament, the angle between it and the sclera proper will become narrower, the small channels will become acutely bent and so blocked, and thus a valve-like action will be induced, which will, under these conditions, prevent any return flow from Schlemm's canal.

An additional feature in figure 3 which demands attention is the clearness with which the denser tissue of the scleral spur is isolated, and, further, whilst the adjacent veins are engorged with blood, the communications between them and the canal of Schlemm are not nearly so free as the means of communication between the canal of Schlemm and the aqueous chamber. From which we may assume, I think, that if by the retraction of its inner wall a negative pressure is established within the canal of Schlemm, fluid will, under normal conditions, more readily enter it from the aqueous chamber than from the surrounding venous circulation.

That blood may enter the canal of Schlemm from the neighbouring venous system cannot be denied, but the conditions under which this may occur, are such as involve a closure or diminution in calibre of the more open channels which connect the canal with the anterior chamber ; this may be due to the obliteration of the iridial angle by the fusion of its sides, or to the presence of some inflammatory condition or material which mechanically plugs the recesses of the pectinate ligament.

As will have been gathered from a consideration of the foregoing observations, any advantage to be gained from the standpoint of a filtration theory must depend upon an *alternation in the lowering and raising of the pressure within the canal of Schlemm.* As has been suggested, the production of a negative pressure within the canal is due to the ciliary muscle pulling back the scleral spur, and thus indirectly through its connection with the pectinate ligament dragging inwards the inner wall of Schlemm's canal, and so considerably increasing its lumen. This action will be followed by an inflow of fluid into the canal, and since we have shown that the channels of communication between the canal and the aqueous chamber are probably freer and more open than those between the canal of Schlemm and the surrounding veins, we may assume that the inrush of fluid mainly takes place from the aqueous chamber. Equilibrium having been established by the filling of the canal, no further flow is possible so long as the ciliary muscles remain contracted. As soon, however, as they relax, the influence of the elastic fibres of the pectinate ligament will come into play, exercising a gentle pressure on the inner wall of the canal of Schlemm as they pull forward the scleral spur to what we may term the position of rest. The pressure so exercised will assist in the expulsion of the fluid contained in Schlemm's canal onwards through the channels which connect it with the venous circulation, since, as has been proved experimentally, although it is possible to inject Schlemm's canal from the scleral veins, it is not possible to force the injection back from the canal into the anterior chamber. This return flow is checked, as has been explained, by the more abrupt bending or kinking of the connecting channels passing from the interspaces in the pectinate ligament into the hinder part of Schlemm's canal, as they lie in the receding angle between the scleral process of the sclera itself, which angle being narrowed by the return of the scleral process to the position of rest, will naturally lead to a compression of the channels which lie within it

(see fig. 5). Even supposing this theory be not accepted, it is easy to imagine how the lymph spaces around the angle may be provided with a system of valve-like openings, which, whilst affording no opposition to a flow in one direction, may by the forcible opposition of their lips, offer an efficient block to any return in an opposite direction, particularly if the flow in the opposite direction be at an increased pressure. Just such an increase in the pressure might be induced by the elasticity of the pectinate ligament itself.

These views are confirmed in a very striking manner by the observations of Ulbrich[1] on a case of partial coloboma of the iris where the aperture was closed by a delicate membrane, which served the purpose of a natural manometer. Although dilatation and contraction of the pupil under the

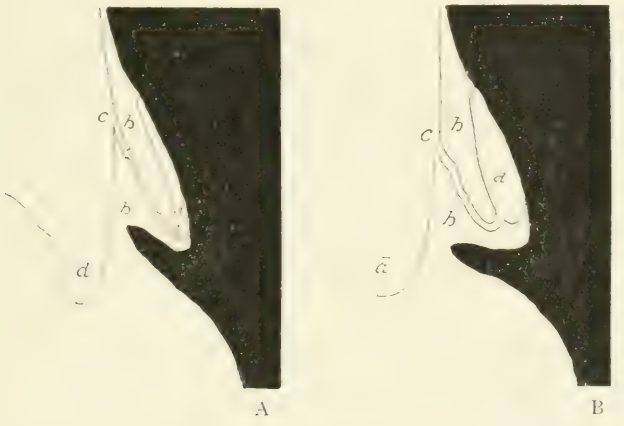


Fig. 5. Diagrams to illustrate how the channels in the pectinate ligament are kinked and compressed when the scleral process is drawn forward and how they are opened and straightened when the scleral process is pulled back thus imparting to them a valvular action.

A illustrates the conditions when the scleral process is pulled forward by the elasticity of the pectinate ligament.

B when the scleral process is pulled back by the action of his ciliary muscles.

a. The canal of Schlemm.

b.b. The trabecular tissue of the pectinate ligament with

c. A lymph channel running irregularly through it.

d in A. Represents the iridial angle when the scleral process is pulled forwards and the pupil dilated.

d in B. When the scleral process is pulled back and the pupil contracted.

action of light did not alter the position of the membrane, yet during accommodation the membrane sank, the extent to which it receded being roughly proportional to the amount of accommodation. Under eserine this reaction was intensified, whilst atropine, on the contrary, annulled it entirely. It seems to me that these observations are readily explained if we accept the foregoing suggestions, for by the indirect action of the ciliary muscle the lumen of Schlemm's canal is increased, thereby establishing a negative pressure, followed by an inrush of fluid from the aqueous chamber, thus temporarily lowering the pressure within the anterior chamber, as evidenced by the collapse of the membrane. Further, the actions of both eserine and atropine seem to afford additional proof of the correctness of these views.

1. *Bericht der Ophthalmologischen Gesellschaft zu Heidelberg*, 1907, quoted from T. Harrison Butler, THE OPHTHALMOSCOPE, June, 1908.

If these conclusions be granted, it is obvious that the efficiency of this mechanism, apart from other conditions which may give rise to secondary glaucoma, depends on the normal functional activity of two factors, *viz.*:— (1) the ciliary muscle, and (2) the pectinate ligament. Any change which impairs the normal activity of either of these structures will consequently interfere with that alternation in their action which has been insisted on as being necessary to induce these mechanical conditions which would promote filtration through the canal of Schlemm. Thus, atrophy or paresis of the ciliary muscle, or any affection which would lessen its contractile efficiency, would militate against such action as it might bring to bear on the scleral spur, and so indirectly affect its influence upon the inner wall of the canal of Schlemm.

On the other hand, a hypertrophy of the muscle, such as is stated to affect the circular fibres in the hypermetropic eye, may, by its constant and prolonged contraction, overcome the elasticity of the pectinate ligament, and so by keeping the canal of Schlemm permanently dilated, permit the establishment of an equilibrium between the pressure within the aqueous chamber and that within the venous circulation, thereby upsetting the mechanism whereby a negative pressure is from time to time set up within the canal of Schlemm. The importance of these observations will be at once apparent when it is borne in mind that primary glaucoma is essentially a disease of late adult life, and that it occurs much more frequently in hypermetropic eyes.

In like manner, any condition of the pectinate ligament which tends to a loss of its elasticity, will materially affect the mechanism which gently compresses the canal of Schlemm and restores it to the condition of rest, for when once a condition of equilibrium has been established within the canal, the pressure exercised by the elasticity of the tissues composing the pectinate ligament is necessary to empty the canal of its contents, and so permit the muscles once more, by the exercise of their combined influence upon it, to establish that condition of negative pressure within the canal which is essential to any such system of filtration. Consequently, the varying degrees of sclerosis of the ligament, so frequently described in association with cases of primary glaucoma, are just such as to destroy its functional activity, and so throw out of gear the mechanism so ingeniously devised by nature; indeed, the break down of the mechanism presents a striking analogy to the changes in the vascular system met with in old age, where the enfeebled muscular tissue of the heart, combined with the loss of elasticity in the arterial coats, contributes to the failure of the circulation.

That there may not be other conditions within the globe of the eye which are in part contributary to the production of glaucoma, such, for instance, as the theory propounded by Priestley Smith regarding the growth of the lens, I am not prepared to deny; at present, however, I am concerned only with the mechanism by which, under normal conditions, filtration takes place between the contents of the anterior chamber and the surrounding circulation.

As an anatomist, it is outside my province to encroach upon the domain of the ophthalmologist, and I must plead ignorance of the clinical facts if the suggestions I am about to make are useless and impracticable, but it seems to me that if the foregoing description of the mechanism involved be correct, the early treatment of cases of primary glaucoma should be directed towards restoring the functional activity of the parts concerned, *viz.*, the ciliary muscle and the pectinate ligament. In regard to the latter, when degenerative changes have once set in, we can, at the best, only hope for an arrest of the process; but when dealing with an atrophied or partially paralysed ciliary

muscle, one might possibly be able, by the use of graduated exercises in the range of accommodation, to restore to some extent the power of the muscle, and so to re-establish in some degree what may be termed its indirect action on the canal of Schlemm.

In cases where the glaucomatous tendency appears to be due to a hypertrophy of the muscle, particularly of its circular fibres, such as occurs in hypermetropic eyes, the earlier tendency might possibly be corrected by the use of appropriate glasses. When, however, this over-action of the muscle is fully established, the division of the annular fibres, were this possible, would seem to afford the only hope of a restoration of that interaction between the ciliary muscle and the pectinate ligament so essential to the mechanism which has been here described.

In the preparation of this paper I owe much to the care and dexterity of my museum assistant, Mr. W. Chesterman, who has so thoughtfully carried out my instructions in making the various specimens on which these observations have been based.

THE STUDY OF OCULAR ROTATIONS.

BY

FRANCIS VALK, M.D., D.Sc.,

NEW YORK, U.S.A.

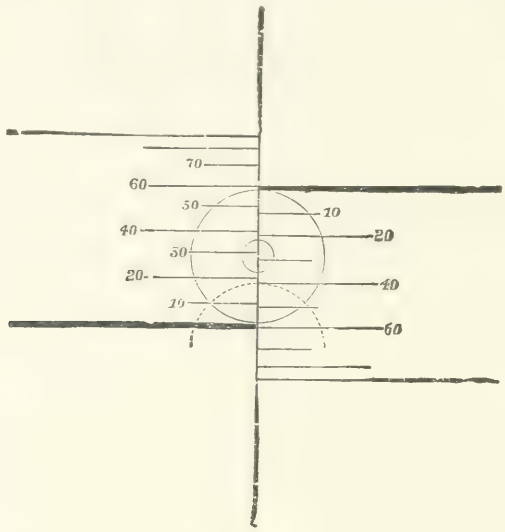
A RECENT reviewer of current literature in THE OPHTHALMOSCOPE (A. J. Ballantyne on Lauder's paper, December, 1910) says in the closing paragraph: "The author's ideas on the pathology and treatment of these conditions (strabismus) being *at a discount* in this country, his arguments will probably not receive much attention. When we come to his cases of squint, we are at a loss to account for his enthusiastic claim that for those who have never used the tropometer in these cases, there remains a revelation in store." But the author finally ends with an approval of Lauder's treatment of squint.

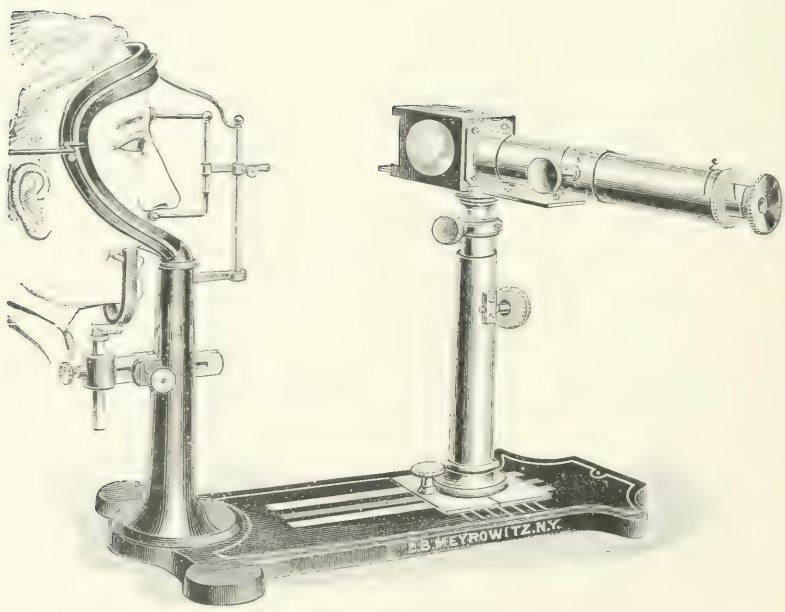
Now, the treatment of squint is one thing, and that of heterophoria is another, and Lauder's paper refers to both conditions, and if the ideas of Lauder are at a discount, as they are in England, and I regret to say also in America, then it must be that they are unworthy of any merit, or else a good business man would clear away the discount and cause them to bear interest. It is with reference to this part of the reviewer's report that I wish to present my personal experience along these lines and to illustrate certain conditions of well-known abnormal rotations of the eyeballs that can only be recognised by the examination with the tropometer, and also to present some hitherto unknown conditions of the ocular rotation that may stimulate some interest in those who are interested in this study of the eye.

Strabismus is supposed to be a simple condition, but from the day of the charlatan Le Cat to the present time we have many theories to account for these deviations, but they only apply to a certain number and not to all. May we not, by a continued stimulation of that interest, find a theory that will cover *all* cases of heterotropia and heterophoria and that will not refer to the cases of paresis or to any pathological conditions?

We may say, then, that the propositions advanced by Lauder's paper have not received any serious consideration in England nor in America. But why? Is it because they are not true, or is it because the old traditions as to the

cause of squint have become so rooted in the minds of nearly all ophthalmologists that they will not listen to any new theory, but will continue to write and to read papers at our scientific meetings, over and over again propounding the old theory of Donder's great antithesis, or the other and more fanciful one of the fusion theory, at the same time all being careful to leave out of their discussion those often met, yet trying, cases which completely disprove their





STEVENS' TROPOMETER.

much quoted theories? Now it seems to me very evident that Lauder's paper does advocate the muscular theory, if I may use that term—in other words, that the muscular balance in the field of vision must have some very important connection with the condition of any and all directions of the optic axes

producing heterotropia or heterophoria in any and all directions. If so, then what scientific instrument or what method will so "quickly, safely and judiciously" demonstrate this condition as the tropometer of Stevens?

Not many years ago it was the good fortune of the present writer to be asked to read a paper before the Buffalo Ophthalmological Society. I selected the subject "The Motility of the Eyes and their Imbalance." I then advocated the use of the tropometer in all these examinations of the cases of squint and of heterophoria. Before the paper was read I had the pleasure of calling upon several of the more prominent men at their offices. I found that nearly every one of them had this useful instrument, but not a single one was in practical use. I am pleased to state that after the paper was read before the Society, during the discussion, each and every one of these gentlemen proposed to renew his interest in the field of vision with the tropometer and to use it in his examinations. The writer is also pleased to notice that at the last meeting of the American Academy of Ophthalmology, the President of the Society, Dr. Wendell Reber, in the discussion on the subject of squint, said "that the operator who does not take an account of the rotation of the eyes is defrauding himself of something he should have. The tropometer of Stevens, rightly used, will give much valuable information."

Now it is self-evident that the useful indications of this instrument had not been properly presented to these oculists, nor had they appreciated the value of their readings of the tropometer in the estimates of the motility of the eye. I have fully presented my own ideas of this subject in my book on Strabismus or Squint, published in 1905,* in which I demonstrated the use of the tropometer. But as it seems evident that the study of the ocular motility in this way has not been fully considered, not only in this country, but also in England, I trust I may be accorded a hearing, and a full and fair discussion of the merits of the *only instrument* that will accurately measure the full motility of the eyes, or, in other words, the excursions of the eye about its centre of rotation in the orbits.

I do not think I am over-enthusiastic in the statement that the tropometer is the only instrument that will accurately measure these rotations, as it is well-known that the old methods, so many years in vogue, of the estimation by the perimeter are practically useless in measuring the inward rotation of the eye and are purely subjective; moreover, surely the old method of following the finger or pencil is crude indeed, and, in my opinion, totally unreliable. We are told, however, to use these methods, and that, by so doing, we will not find any deficiency in the rotations. Now, with these views there must be some fault in the conclusions. Does not the subject present sufficient importance to justify a careful study, or shall we accept Stevens' latest theory that it is all in the torsion of the eye, or, still further, that of one of our ophthalmologists who says of squint, "Operate, yes; and if you get an over-correction, operate to put it back"? I cannot accept either of the last-named suggestions. My experience has proved that in *all* cases of squint and of heterophoria we do have a deficiency of rotation, and that the tropometer will unfailingly demonstrate just where we will find that weakness and just what will be the best procedure to correct it. It has been stated that it is a mistaken idea to speak or to write of the strength or the weakness of any of the ocular muscles. Be that true or not, I have noticed that, although the assertion is frequently made, I have never read any practical argument that would prove a weakness does not exist; and in my personal experience—and I have examined many cases of squint and of heterophoria—

* See Valk on Strabismus, p. 89, 1905.

I have always found it well marked by the examination with the tropometer, and I do not hesitate to confirm Lauder's claim that a careful use of the tropometer in all these cases will have a "revelation in store."

Now, let us take up for consideration the following points—that is to say, the usefulness of this instrument, the *indications* it will demonstrate, the fact that it may prove that squint and heterophoria *are not always binocular*, and also the fact that, if such be the case, *we may operate on the wrong eye.* For the purpose of our argument, or I might say the advancement of the muscular theory in these cases, I would quote from a well-known author, Worth, on Squint, page 168, where I find these words: "Heterophoria may be due to a *muscle* or group of muscles being too weak or too strong for the opponents . . . . the muscle acts at less or more than its normal mechanical advantage." "Heterophoria is essentially a motor anomaly." . . . . "Heterophoria may give rise to a permanent squint." If we accept that proposition, then the muscle theory of squint must have some reasonable cause of existence and cannot be fully "at a discount" in this country, and that postulate does prove the usefulness of the tropometer in the estimation of the weakness or strength of the ocular muscles. Furthermore, all the most recent writers of text-books have accepted the nomenclature of Stevens in reference to the conditions known as anophoria or kataphoria, or double upward or downward squint—that is to say, the condition in which both eyes have a decided tendency to turn or deviate upward or downward greater than the normal positions of the eyes, and the influence of the tropometer is again proved, as it is the only instrument that will demonstrate these conditions. That they do exist I can well bear testimony, as I have examined them, and have proved their existence, from the success of the operations in which the diagnosis was made and could only be made by an examination with the tropometer.

Let us now for a moment turn to the indications that the tropometer will demonstrate. In the use of this instrument we must establish a normal or standard rotation, and I would state that one of our best text-books, that of de Schweinitz, page 883, quotes from Stevens as follows: "The most favourable rotation is upward 33°, downward 50°, inward 55° and outward 50°." I have proved these measurements many times, and believe them to be practically correct. Now, if this is a standard rotation, and a case presents any decided deviation from this standard, it must show either too great or too small an arc of rotation, as the eye is turned on its centre of rotation. You may call this innervation if you wish, but I think that is rather a hard proposition to prove. But we do know, when operating, that some muscles appear to be larger or smaller than normal; or, in other words, we do find one muscle very large, and its antagonist very small, when the muscle is exposed for advancement or tenotomy. Furthermore, we may well ask what influence does innervation have on the action of a muscle after an operation, except that the same innervation must act with greater force if we change the physical condition of the muscle by an operation. If we have established a standard for the field of version, as indicated above, and it seems to be accepted by our text-books, then a deviation from that standard must indicate the form and condition of heterophoria and heterotropia that may be present. Let me illustrate this with an examination of a case of anophoria. What will the examination with the tropometer show? I have met these cases and they always show an increased upward rotation and a decided deficiency in the downward rotation; in other words, an upward rotation of much more than 33° and a downward rotation of much less than 50°, as for example 40° up and 40° down. These people are very unhappy, as they can only find comfort with the head tipped forward, so raising the binocular plane

of regard. The opposite condition is well illustrated in kataphoria in which the head is thrown backward and the plane of regard lowered. Let us now examine these rotations in another region—that is to say, to the right or left. This subject was not dwelt upon to my knowledge, until I read a paper on the subject before the American Academy of Ophthalmology in 1905*, at which time I suggested as names for these abnormal conditions, dextrophoria and lævophoria, respectively. Now, if we accept the well-known conditions of anaphoria, it goes without saying, almost, that the condition of dextrophoria may also exist. This I can testify to from many cases on my note-books. If one will accept the theory, as fully proved and demonstrated by myself, then we may intelligently answer the last two questions as previously given.

I will endeavour to answer first the question, is squint or heterophoria always binocular? I do not think so, and will illustrate from the findings of the tropometer. In a given case of squint we find the right eye fixing and the left eye turned inward. Now, after the examination of the refraction we place the little patient in the tropometer, and what are the rotations? R.E. goes in 50° and out 50°, but the left eye goes in 60° and out only 35°. In such a case, although the cover test may show a concomitant squint of the R.E. yet I feel confident that any operation on the R.E. would not be indicated, and that a suitable operation on the L.E. will correct the deviation.

Is not the squint monocular? These cases do occur, and, if so, prove the immense value of the tropometer in this examination. Furthermore, we may find normal inward rotation of each eye, as 55°, but both externi are deficient in the power of outward rotation, as showing only 40°. Such a result does not indicate a tenotomy, but simply an advancement or shortening of the externi.

Both of these illustrative cases I have on my notebooks with final success after operation according to the indications.

We now come to the last and perhaps the most important question. May we operate on the wrong eye? This question we might say is answered from the many cases which have not been benefited or have been made worse by tenotomy of a muscle which should not have been operated upon. I would illustrate this in this way.—Some time ago, I was consulted by a young man at college with a very decided esophoria, so that he was unable to study. I advised an operation, but the father preferred to have their local oculist operate and took him home for that purpose. An operation was performed and the ocular condition was worse than formerly. Did the oculist operate on the wrong eye? Let us see.—The boy showed a well marked esophoria of 8°, and when I examined him by the tropometer, he showed a clear dextrophoria, in other words, the inward rotation of the R.E. was much less than normal, but the L.E. would rotate inward more than normal and outward much less; as, for example, R.E. in 40°, out 50°; L.E. in 60°, out 35°. Yet the local oculist did a tenotomy on the right eye. Had he performed the same operation on the left eye, the ocular condition would have been improved and the esophoria corrected. In passing, I would state that in this case my proposition was to shorten the left externus and so improve the outward rotation of that eye. I have notes of several of these cases.

I am well aware that these theories do not accord with the recent text-books on motility; but I am fully assured that they are essential, and that they do seem to illustrate the proposition that strabismus may be monocular, and that we, as ophthalmic surgeons, may operate on the wrong eye. If so, then our past study of the ocular motility has not been complete, and a further study along these lines may be advisable.

* *Transactions*, 1905, p. 187, On Dextrophoria.

I trust that these thoughts, as brought out by the reviewer in THE OPHTHALMOSCOPE, may bear some fruit, and that they may stimulate some others, beside Lauder of Cleveland, to investigate these rotations and correctly to interpret the findings of this most useful instrument, the tropometer.

THE INSTRUMENTS USED IN DR. W. A. FISHER'S OPERATION FOR CATARACT.

In THE OPHTHALMOSCOPE of April last Dr. W. A. Fisher, of Chicago, published a communication on "The Choice of a Cataract Operation," which has attracted considerable attention in Great Britain. In the course of that article he described certain special instruments employed in his operation. Unfortunately, no illustrations accompanied his paper. Several readers of THE OPHTHALMOSCOPE have suggested that such illustrations would be useful, and so they are now given.

FIG. 1.—Fisher's Lid Retractor.

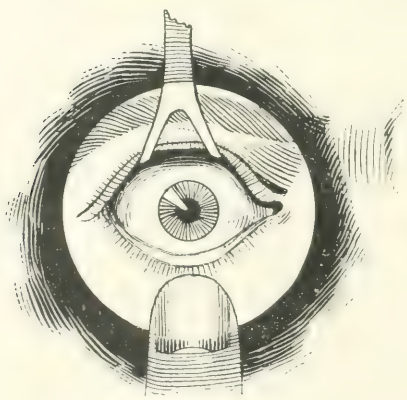


FIG. 2.—Lid Retractor in position.

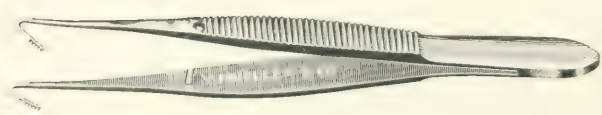


FIG. 3.—Fisher's Capsule Forceps.

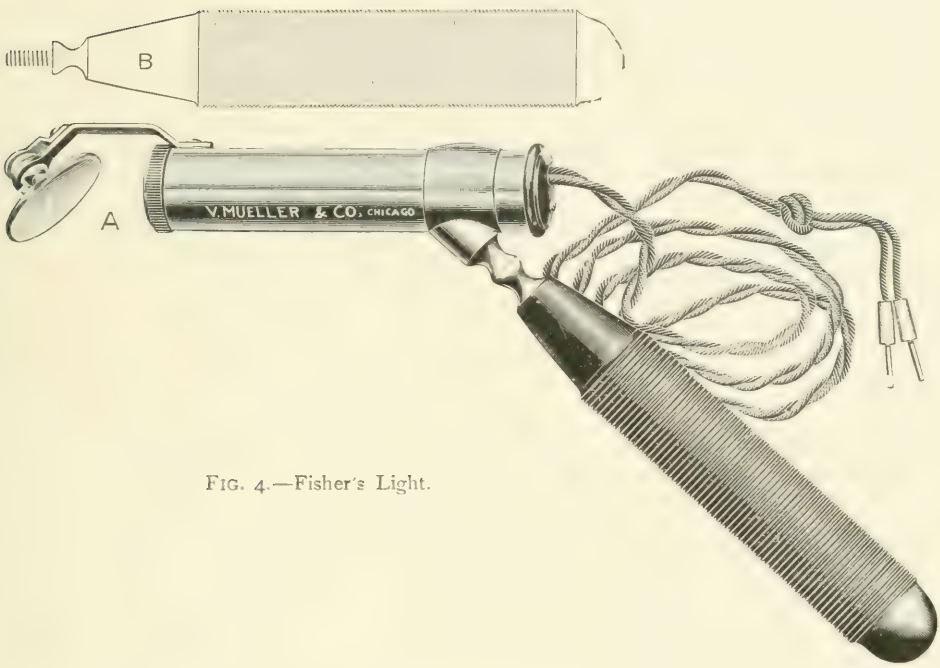


FIG. 4.—Fisher's Light.

ON MY TECHNIQUE IN LIMBAL SCLERECTOMY FOR GLAUCOMA.*

BY

DR. S. HOLTH,

CHRISTIANIA, NORWAY.

SINCE June, 1908, I have realized Professor Lagrange's happy idea of anterior sclerectomy in glaucoma by means of a *technique* consisting in the three following points:

1.—Subconjunctival opening of the anterior chamber by a very oblique incision, 6 mm. long, with a bent keratome (Fig. 1).

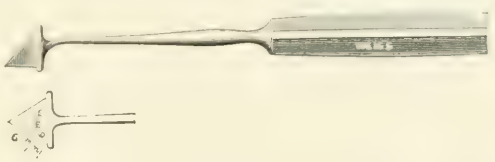


Fig. 1.—Stop keratome 6 mm. by 6 mm. bent at an angle of 45°; Dr. Holth's first pattern. The model with strengthening in the median plane (THE OPHTHALMOSCOPE, 1909, p. 776) was advantageous for making the subconjunctival pocket simultaneously with the scleral incision but rendered this latter sometimes slightly irregular.

This incision permits a very slow evacuation of the aqueous; prolapse of the iris is therefore rare. The ciliary body is not laid bare. The corneal

*Read before the Oxford Ophthalmological Congress on July 21st, 1910.

astigmatism is very slight after the operation, less then 1.0 D., often *nil*. Rupture of the zonula and intraocular hæmorrhage hardly ever occur.

2.—Sclerectomy with a punch forceps; this allows an easy *dosage* of the scleral excision. The sclerectomy alone is sufficient to secure a permanently normal tension.

3.—An iridectomy, in most cases only consisting in a minimal excision of the iris periphery, ought, however, to be made. This iridectomy is not made for curative purposes, but only to prevent a later prolapse of the iris, which might block the scleral fistula. The round central pupil is, therefore, as a rule preserved. Patients who have a "key-hole" pupil are often afflicted with symptoms of dazzling.

In THE OPHTHALMOSCOPE of November 1909, p. 774-781, readers may have seen an illustrated abstract of my communication on the operation before the *Société Française d'Ophtalmologie*, May, 1909.

I will add some words on the principal instrument, the punch forceps.*

I only use the modification of the Vacher instrument for irido-capsulectomy.† The chief points in the modification are.—1. Parallelism of the blades just before they are closed. 2. Some tranverse sharp ridges on the upper surface of the lower blade, whose margin in this way becomes slightly saw-edged. By this means the sclera does not slip during the cutting, which can be performed with far less effort ‡ than when the edges of the two blades are even.

I earnestly insist on the "saw-edgedness" above described of the upper margin of the lower blade. In ordering the instrument, this ought to be expressly demanded, as I have seen that some instrument makers are inclined towards an "improvement" by filing away the ridges along the edge, a mutilation by which what is left of the ridges in the middle of the surface will be quite ineffective. I also advise against making the lower blade smooth placing the ridges on the lower margin of the upper blade, as I have seen done; for by this arrangement the border of the sclerectomy wound would be squeezed. In my model the ridges will only squeeze the scleral piece which is to be removed.

For sclerectomy of the anterior lip I use my ordinary pattern instrument with blades 3 mm. broad, whose ends are rectangular (fig. 2) §.

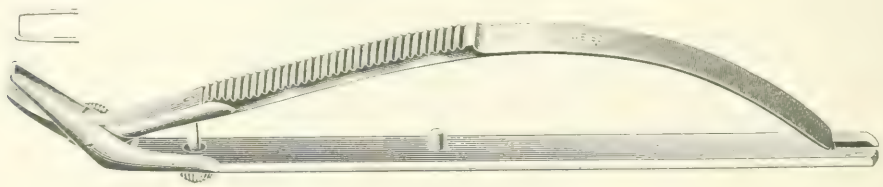


Fig. 2.—Dr. Holth's punch forceps with rectangular ended blades, 3 mm. broad, for sclerectomy of the anterior lip of a keratome incision 2.5 mm. from the limbus.

* I have all my instruments in a hermetically closed metal box sterilized in dry hot air at 160° Centigrade for thirty minutes. The punch forceps, as well as the edges of all sharp instruments, are in this way better preserved than by boiling. The dry hot air sterilizing (*e.g.*, with the "*stérilisateur Poupinel*") is used by many French oculists. An American kitchen gas stove with a thermometer through the top (*e.g.*, "Monarch" with asbestos-lined walls) is cheap and will do very well. Electric stoves are good but expensive.

† In my rare cases of thick adherent secondary cataract I use this operation no longer, because it can cause loss of vitreous. I prefer irido-capsulotomy made with the knife-needle described by S. Lewis Ziegler (*American Medical Association*, 1908).

‡ The cutting power of the punch forceps may advantageously be tried on the thin rubber membrane of a finger condom dipped in lukewarm water. If there is a spot on which the blades do not fit exactly, the thin membrane will not be cut, but be drawn out into a thread.

§ Than this it would be better, as does Forsmark (*Hygieia*, 1911, p. 246), to make the lower blade hollow with a sharp margin; but I believe that the blade will be weakened by this, as was the case with the American punch forceps which I used for my first operation.

For sclerectomy of the posterior lip I have used a model with blades, 2mm. broad, whose ends are semi-circular (fig. 3). This instrument is also very convenient to remove the scleral disc in sclerectomy with Bowman's trephine (2 mm. broad).

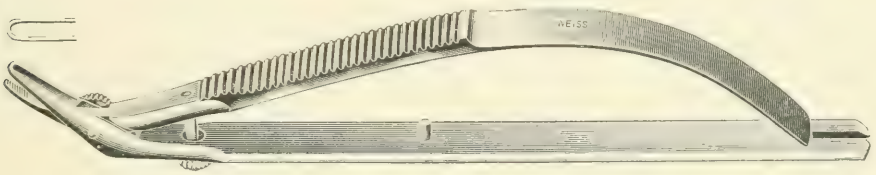


Fig. 3.—Dr. Holth's punch forceps with round-ended blades, 2mm. broad, for sclerectomy of the posterior lip of a keratome incision, 0·5 mm. from the limbus.

The limbal sclerectomy, for anatomical reasons, ought to be performed only in the vertical meridian, upward or downward, for here the conjunctiva and the sclera reach farther over the cornea, and, consequently, the space is greater to perform sclerectomy within the limits of the anterior chamber. Outwards and inwards, on the contrary, the sclera ends more steeply, and there is too little room for a sufficient sclerectomy. By attempting sclerectomy in these places with the punch forceps the chamber is, indeed, opened at once by the keratome* incision, but at the performance of a scleral excision of 1.5 mm. breadth, there is a risk of cutting through the insertion of the conjunctiva at the limbus. I therefore gave up these lateral operations after a few attempts (compare The Ophthalmoscope, 1909, p. 779).

In my ten first punch forceps operations I made both the subconjunctival pocket and the scleral incision (0·5 mm. from the limbus) with the bent stop keratome and then cut out a piece of the *posterior* scleral lip (fig. 4) with the narrow punch forceps (fig. 3.)

After the ten first cases I sometimes performed this operation when the anterior chamber was rather shallow, because here the more peripheral incision for sclerectomy of the anterior lip is rather difficult. I have also added an excision of the posterior lip to that of the anterior lip when the piece cut out here has become too small (less than 1 mm.) which, under simultaneous making of the subconjunctival pocket, has happened by the keratome incision having been made too near the limbus.

Fig. 4.—Sclerectomy of the posterior lip with the narrow punch forceps (Fig. 3); the scleral incision (0.5 mm. from the limbus) and the subconjunctival pocket are made simultaneously with the stop keratome (Fig. 1.) (See also The Ophthalmoscope, 1909, p. 777, Fig. 7).

* A sclerectomy here with the Bowman corneal trephine, after Freeland Fergus, will lay the ciliary body bare and not open the anterior chamber, in order to reach which the operator must perform a cyclo-dialysis.

† In my first case the punch forceps (an American instrument for irido-capsulectomy) were too weak for the sclerectomy. I was forced to finish the operation with a triangular sclerectomy ot the posterior lip by means of two cuts with an ordinary pair of scissors as recently recommended by Jacqueau (*Société Française d'ophtalmologie*, May, 1910). I think that the single cut with my punch forceps, which cuts quickly without squeezing the lips of the wound, as said by Verhoeff (The Ophthalmoscope, 1910, p. 188), is preferable.

In most cases I have made the sclerectomy of the anterior lip through the very oblique stop keratome incision placed 2 mm. to 2.5 mm. from the limbus, either under a subconjunctival pocket (Fig 5) or under a stump-angled flap (Fig. 7.)

The subconjunctival pocket may, as in Fig. 5, be made with the keratome simultaneously with the scleral incision, or it may be made with scissors before the keratome incision. In the first case scissors must be used to loosen the conjunctiva from the sclera between the scleral incision and the limbus.

FIG. 5.—Sclerectomy of the anterior lip with the large punch forceps (Fig. 2) through a keratome incision 2·5 mm. from the limbus.

When the conjunctival pocket is formed, some skill is required from the assistant, in order to pull the conjunctiva towards the limbus by means of my double blunt hook (Fig. 6).

FIG. 6.—Dr. Holth's double blunt hook for pulling the conjunctiva towards the limbus after the subconjunctival pocket incision.

In order to render the assistance easier, I have therefore often before the scleral incision cut an obtuse-angled conjunctival flap (Fig. 7). The limiting incision of this flap, contrary to that of Major Elliot (THE OPHTHALMOSCOPE, 1909, p. 805), should cease some millimeters from the limbus. By continuing the cut close to the limbus an incident may happen which I described in the *Annales d'Oculistique*, 1907, 1, p. 367. In this case after an iridencleisis performed in 1905, I obtained an excellent fistulous cicatrix under such a flap; but a large thin conjunctival blister, limited by the cicatricial line of the flap, appeared. This blister burst four months after the operation, and the anterior chamber was evacuated. I had to make a wide undermining of the

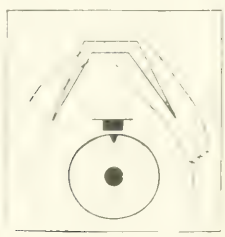


FIG. 7.—Sclerectomy with punch forceps of the anterior wound lip after keratome incision under an obtuse angled conjunctival flap made beforehand with scissors.

conjunctival cicatrix, in order to cause the blister to disappear and the chamber to reappear. The final result was good, with œdema of the conjunctiva instead of the blister. Vision was retained, and tension was tonometrically normal.

The punch forceps operation* with conjunctival flap is made in the following manner:

*Generally, I employ pilocarpin (more rarely eserin) until two hours before the operation; but I do not employ myotics during last twelve hours when I am to combine a sclerectomy with an ordinary "key hole" iridectomy (for optical reasons, or advanced cataract, or consecutive glaucoma in "iritis serosa"). As anæsthetic, I employ five drops of cocaine (5 per cent.) for ten minutes; between the first and second drop of cocaine a drop of adrenalin (1:1000) is instilled.

1.—An obtuse-angled conjunctival flap with broad base and the top 12 mm. from the limbus is first cut—generally upwards. The divergent cuts limiting the flap must end 4 mm. or 5 mm. from the limbus. The first snips to loosen the flap should be superficial—between the conjunctiva and the subconjunctival tissue, to avoid hæmorrhage from the great episcleral vessels ; within 3 mm. or 4 mm. from the limbus, the snips can be made deeper into the subconjunctiva and the sclera laid bare to the cornea.

2.—The patient is asked to look downwards, and the assistant lifts the flap in a vertical direction. The inferior limbus is fixed with my elbowed forceps (Fig. 8), held in the operator's left hand. With the bent stop-keratome (Fig. 1) in his right hand he punctures the sclera 2 mm. or 2·5 mm. from the limbus for sclerectomy of the anterior lip (0·5 mm. from the limbus for

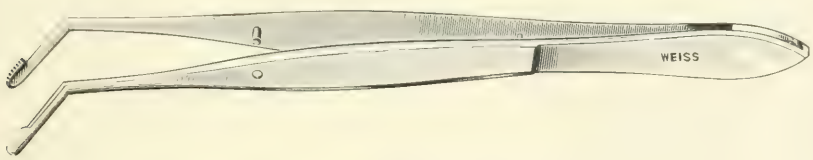


FIG. 8.—Dr. Holth's elbowed forceps useful for fixation of the inferior limbus, when the eye has to be turned downwards far enough to make the subconjunctival incision above with the keratome. This pattern without a catch is also the best, when the patient is under a general anæsthesia. Here the sclerectomy (under the conjunctival flap) ought to be made downwards, the fixation consequently at the superior limbus.

sclerectomy of the posterior lip) ; then the keratome is introduced very obliquely into the anterior chamber until the incision is 6 mm. When the keratome, with lowered handle, is withdrawn, every pressure against the globe with the fixation forceps must cease. Otherwise, there will be sudden escape of aqueous and prolapse of the iris. The anterior chamber ought, however, now to be emptied ; but slowly, by repeated, slight, short pressure on the posterior lip of the wound. In this way a prolapse of the iris can nearly always be prevented.

3.—The operator himself now lifts, with his left hand, the conjunctival flap, and introduces the lower blade of the broad punch forceps (Fig. 2) so far under the anterior wound lip that he sees 1·5 mm. of the lip through the upper open blade. A piece of sclera, 3 mm. by 1·5 mm., is quickly cut out (for the posterior lip – incision 0·5 mm. from the limbus—I use the punch forceps with narrow round ended blades (Fig. 3).

4.—The assistant keeping the conjunctival flap down, the operator grasps the iris periphery with a curved iris forceps (one with stop screw—Fig. 9—is preferable) and cuts out as little as possible—about 1 mm.—with Wecker's scissors.

FIG. 9.—Iris forceps with stop screw for limiting the separation of the blades to 1·5 mm. when it is desired to make a very small peripheral iridectomy.

5.—The top of the conjunctival flap is sutured with fine black silk. In very hard and deeply-sunk eyes the suture may be applied immediately after the formation of the conjunctival flap and left arranged as a loop (Fig. 7) during the remaining steps of the operation, which, however, is somewhat complicated

by this. After this, the thread is tied without making the patient look downwards. Under such circumstances it may also be advantageous to perform the operation downwards (as in cases operated upon under general anæsthesia.) The suture can be removed after a week*.

After the removal of the keratome in the second step of the operation, it may happen (especially in cases where the pupil is not well contracted with myotics) that the anterior chamber cannot be emptied with repeated pressure on the posterior lip. The cause of this is that the iris periphery blocks the interior end of the wound. In this event the iris spatula may be introduced into the wound, but I prefer generally in such cases to perform the third step, the sclerectomy, without previously emptying the anterior chamber. It may then happen that the punch forceps, besides the sclerectomy, also makes a buttonhole in the periphery of the iris, which then, as a rule, slips in again. If this happens the fourth step is superfluous. But if an iris prolapse after all appears I do not put it in with the spatula, but make a common "key-hole" iridectomy. If an iris forceps for this purpose must be introduced in the chamber it must be made near the end of the wound to avoid touching the lens through the previously performed buttonhole in the iris periphery.

In chronic glaucoma with an extremely shallow, hardly perceptible, anterior chamber, the keratome is not suitable for the incision. After making the conjunctival flap, as in Fig. 7, the sclera can be incised from without inwards parallel with the iris plane, in the way that G. T. Brooksbank James (*Transactions Ophthalmological Society*, Vol. XXX, Fasc. I, 1910) recommends. The von Graefe linear cataract knife may also be used in the same manner from outside inwards parallel with the iris. But in both cases there will be a flap† wound in the sclera, which, in my opinion, involves more danger of rupture of the zonula and expulsive hæmorrhage than the linear incision with the keratome, which gives, on the contrary, a valve-shaped wound. To obtain a similar incision when the chamber was hardly perceptible, I used a specially constructed sclerotome (Fig. 10) covered by a sliding metal cap, which allows regulation of the depth of the incision between 0·5 mm. and 1·25 mm.

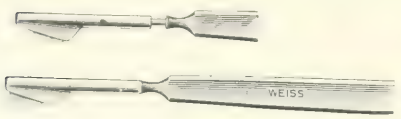


Fig. 10.—Dr. Holth's sliding cap sclerotome for graduated incision of the sclera in cases with an extremely shallow anterior chamber.

After cutting the conjunctival flap, as in Fig. 7, I have, with this instrument, made a 6 mm. incision through the sclera, 1·5 mm. from the limbus, not quite parallel with the iris plane but a little steeper. Then sclerectomy (1 mm. by 3 mm.) with the broad punch forceps (Fig. 2); finally, a button-hole in the iris periphery.

The utmost care must be taken in these cases—as also by the Elliot trephine‡ operation—not to cut too deep, lest the zonula should be damaged

* In my opinion, this suture is of the greatest importance for the prevention of infection when the subconjunctival flap has been formed. When the subconjunctival pocket has been made (Figs. 4 and 5), the suture is less necessary; but also here I think it safer to use it, as I see that Forsmark (*l.c.*) does.

† If an anterior chamber of the ordinary depth is opened by such a flap-shaped incision from outside inwards, I believe that there will often appear a prolapse of the iris so considerable that an ordinary "key-hole" iridectomy will be necessary. I perform the little peripheral buttonhole only when the iris is in its place; in case of prolapse I always make the iris excision to include the sphincter.

‡ I have tried this operation in some cases of chronic glaucoma with normal anterior chamber. The scleral piece never followed the trephine but had to be removed with forceps and scissors or, still better, with my narrow punch forceps (Fig. 3). If the iris after the removal of the scleral piece was in its place, its periphery was often very difficult to grasp through the small scleral opening. If now the little button hole in the iris periphery is omitted, it happens that the pupil is dislocated somewhat

through the iris periphery, and, by this, loss of vitreous should be risked ; vitreous in the scleral opening may often prove unfavourable for the " filtration* " or formation of a fistula.

In most cases of subconjunctival fistula cicatrix in the limbus, whether the cicatrix is owing to iridencleisis or sclerectomy, there is one or several of the following conditions in the conjunctiva above and around the cicatrix, *viz.*, thin blister, œdematous cushion, or diffuse œdema ; these conditions are increased by massage, at the same time as the tension sinks more or less. Only the slight pressure of the smallest weight in Schiötz's tonometer (5·5 grams) may be sufficient to make the tension somewhat lower by the second or third measuring in the same examination. Blister, cushion, or swelling are nothing but signs of the greater or smaller resistance of the subconjunctival lymph vessels against the escape of the aqueous. Some few times I have seen these œdematous conditions absent from true subconjunctival fistulous cicatrix, which had caused normal tension. One of these cases was examined *post-mortem* five months after the operation (iridencleisis) ; there was a well-developed iris fistula, which connected the anterior chamber with a great lymph fissure communicating directly with Tenon's space.

After my sclerectomy with punch forceps through the keratome incision, I have only twice seen a vitreous pearl in the wound ; both cases were instances of *glaucoma obsolutum degenerativum*. The tension, it is true, became normal ; but yet I believe that in such cases the eyes either should not be treated, or when great suffering is present, should be enucleated. For after the two sclerectomies I saw a slight shrinking of the globes after the tension had become normal. Such degenerated eyes may, when shrunken, cause sympathetic ophthalmitis, which they do not do as long as they remain hard.

In hydrophthalmos my *technique* differs somewhat from that above described. As general anæsthesia is always necessary, and as the globe is usually rotated upward, the operation must naturally be made downwards. Here I always use the obtuse-angled conjunctival flap. The pupil must be strongly contracted with eserin. After the keratome incision, I make no attempt to empty the enormous anterior chamber, which might cause intra-ocular hæmorrhage. I make the sclerectomy 3 mm. by 1·5 mm. from the anterior lip, and then, as quickly as possible, the peripheral hole in the iris.† Under deep anæsthesia both succeed, as a rule, without loss of much aqueous. The conjunctival suture—sterilized reindeer tendon No. 000 (from H. Carrion & Cie, Paris), so as to avoid anæsthesia later on for removal of the suture—applied beforehand, is now tied.

I do not often see complications after the punch forceps sclerectomy. Sometimes, the anterior chamber may remain empty for a few days. In some of these cases I have seen the transitory detachment of the choroid, described by Fuchs after cataract extraction and ordinary iridectomies. Once I have seen it to remain so for several weeks ; but even this case eventually resulted in normal depth of the chamber, reattachment of the choroid, and good vision.

upwards as a sign that the iris blocks the scleral fistula. But it also happened that the iris fell out immediately after the removal of the scleral disc and the iris excision was easy but resulted in a keyhole pupil. I mean that by my operation, where the little peripheral iris excision, preventing prolapse, is easy to perform, the chances are greater of keeping a round central pupil.

By Elliot's operation with the 2 mm. wide trephine the anterior end of the ciliary body is laid bare, which I think had better be avoided ; a trephine of only 1 mm. diameter will hardly give a permanent fistulous cicatrix.

* I agree with E. Treacher Collins that the " filtering cicatrix " and the " fistulous cicatrix " are in reality identical.

† When peripheral iridectomy is omitted, there is, I think, less danger of a late prolapse of the iris in eyes with a very deep anterior chamber than in ordinary cases of chronic glaucoma.

In most cases the depth of the anterior chamber is normal the first day after the operation.

Iritis has appeared a few times between the fourth and ninth day. Therefore, I do not permit the patients to leave the hospital before the tenth day. A single instillation of cocain (5 per cent.) and scopolamin (0·2 per cent.) or atropin (1 per cent.) is sufficient to prevent posterior synechiæ or to loosen them completely, when they already exist. This use of mydriatics in glaucomatous eyes is absolutely without danger the first week after the sclerectomy : the tension (tonometrically controlled) is never increased thereby.

It is only when iritis appears while the chamber is empty that the case becomes difficult, because mydriatics have no influence on the pupil during this state. In such a case I was later obliged to make an optical iridectomy, owing to a pupillary membrane.

From June, 1908, to July, 1910, I have performed limbal sclerectomy with punch forceps in 88 glaucomatous eyes. I have nearly always obtained tonometrically controlled normal tension (15 mm. to 25 mm. of mercury with the Schiötz tonometer) and good, even surprisingly good, effects as regards the sight and the visual field.

As after successful iridencleisis operations, I have often seen considerable decrease in the glaucomatous excavation of the optic disc. I have even repeatedly witnessed it disappear completely.

Transitory levelling of glaucomatous cupping after the performance of an ordinary iridectomy was seen in a single case by von Graefe, and later by Kugel and da Gama Pinto. Axenfeld (*Klin. Monatsbl. f. Augenh.*, 1902, and—in a paper of Weekers—*Ibidem*, 1907, Bd. XVL, S. 247) has the merit of again drawing the attention to this phenomenon, not mentioned either in the larger text-books of ophthalmology or even in monographs on glaucoma.

In June, 1907, at the Third Scandinavian Ophthalmological Meeting in Christiania (*Tidsveskrift for den Norske Lægeforening*, 1907, p. 762) I mentioned that after iridencleisis I had repeatedly seen complete and permanent disappearance of the glaucomatous excavation and demonstrated two cases as instances in point. Rochon-Duvigneaud (*Archives d'Ophtalmologie*, mars, 1908) has seen the same result after a Lagrange operation. In my former paper on sclerectomy with punch forceps (*Annales d'Oculistique*, 1909, 2, p. 1) I mentioned a case of absolute glaucoma where an excavation, 6 dioptres deep, disappeared completely in the course of nine months after an iridencleisis ; later in the same communication, I said that I had begun to see the same thing take place after the new operation.

In 1907 I tried to induce my colleague Ole B. Bull to reproduce the phenomenon in colours ; but he was prevented by illness.

While the permanent disappearance of the excavation of the disc after ordinary iridectomy is evidently very rare, this, in my opinion, depends, not on deficient observation, but on the fact that after this operation the tension in chronic glaucoma seldom becomes quite normal. If, on the other hand, permanent flattening, partial or complete, is often seen after operations leading to subconjunctival fistula close to the limbus (iridencleisis, limbal sclerectomy), the explanation is easy, *viz.*, that after these operations the tension becomes, as a rule, normal or slightly sub-normal. It is especially in the latter case that a complete flattening is found.

Axenfeld (*Bericht*, Heidelberg, 1910, p. 49) communicated several cases of permanent flattening, especially after the Lagrange operation, and he showed some illustrative drawings in black and white.

EMBOLISM OF THE CENTRAL ARTERY OF THE RETINA IN A GIRL AGED $11\frac{3}{4}$ YEARS.

BY

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Introduction.

A GLANCE through the thirty volumes of the *Transactions* of the Ophthalmological Society of the United Kingdom will show that, of the eighteen cases of obstruction of the central artery of the retina, or of its branches, of which the ages are given, none was below sixteen years of age. Of the total number included in the volumes, only five (or 27 per cent.) were below twenty-one years of age. Indeed, literature contains comparatively few references to obstruction of the central artery in children. One of the best-know British cases, perhaps, is that of Sir H. R. Swanzy, reported thirty-six years ago (*Ophthalmic Hospital Reports*, September, 1875), in a girl, aged ten years, who had no cardiac affection but who suffered from chorea, which had made its appearance almost simultaneously with the blindness.

Speaking for myself, I may say that the case to be described immediately is only the second of the kind that I have been fortunate enough to recognize in children. The other case was reported some six years ago in the *Reports of the Society for the Study of Disease in Children*, Volume VI, p. 46. The patient, a girl aged 15 years, had suffered from subacute rheumatism. The condition of the left fundus oculi was fairly typical of the condition commonly spoken of clinically as "Embolism of the central artery of the retina," although the child retained a small area of the visual field on the inner side, due to the presence of a cilio-retinal vessel. There were no signs of hereditary syphilis. The urine contained neither albumen nor sugar. Several members of the Society, who examined the patient's heart at the meeting where she was exhibited, thought that there was, at intervals, a faint mitral systolic *bruit*. There appeared to be no reasonable doubt in this case that the blindness was actually due to embolism.

Case.

L. B., æt. $11\frac{3}{4}$ years, attended the eye department of the Queen's Hospital for Children on December 15th, 1910, with the complaint that she had lost the sight of one eye suddenly.*

Family history.

Mother healthy. Father suffers from asthma. Patient is one of ten children born alive, of whom four only survive, the remaining six having died in infancy from "wasting." One of the patient's siblings is affected with tuberculosis. There have been three miscarriages.

Personal history.

Patient had measles at six years of age, and scarlet fever four years later. Although there is no history of rheumatism, the child has suffered from pains in the legs. During the past year she has occasionally complained of giddiness and frontal headache, but there has been no failure of sight in either eye. On December 8th last she experienced some slight pain over the left eye, and on awaking next morning, she found that the sight of that eye had gone. She at once mentioned the fact to her mother, who could see nothing amiss with the eye.

*Patient shown Royal Society of Medicine, Section for the Study of Disease in Children, on January 27th, 1911.

On admission.

Right vision = $\frac{6}{9}$; left vision = no p.l. Pupils equal. The left pupil has little, if any, direct action to light, but, on the other hand, its indirect response to light is greater than that of the other pupil. When light from an ophthalmoscopic mirror is thrown into the eyes the reflex from the right eye has its normal orange colour, while that from the left is palish. The right fundus is normal, and, in particular, the retinal vessels show no evidences of disease. The left fundus shows the ophthalmoscopic picture characteristic of so-called "Embolism of the central artery of the retina"—namely, filiform retinal arteries, and œdema in and around the yellow spot region, together with a red spot at the fovea centralis. The optic disc is blurred by the surrounding œdema (*see* figure).

As regards the general condition, the following notes were made:—heart not enlarged; a slight systolic murmur was to be heard. Examination of chest proved to be negative. The reflexes were normal, save that the left knee-jerk appeared to be slightly *plus*. No evidence of inherited syphilis. The Wassermann reaction was negative. The urine, specific gravity 1014, was faintly acid, showed a few flat epithelial cells, but no casts, and was free from albumin, sugar, and blood. No micro-organisms could be grown from the blood.

Progress.

December 22nd, 1910.—The optic disc is now white and badly defined at upper and lower border; it is not, however, swollen. The retinal veins are perhaps somewhat smaller than those of the right eye. There can be no doubt that the retinal arteries are smaller than normal and than those of the right eye. The œdema, noted as present in the central region of the fundus on December 15th, is less marked. The central red spot can still be recognized, especially by the indirect method of ophthalmoscopic examination. When digital pressure is made upon the globe, the inferior artery pulsates with great readiness, but no pulsation can be made out in the superior artery. The indirect action of the left pupil to light is good, but its direct action is very slight. Left vision=no p.l.

January 12th, 1911.—Left vision=no p.l. Reaction of left pupil to light sluggish. The optic disc is white. The retinal vessels are still somewhat attenuated. The contrast between the fovea centralis and the surrounding fundus is not now particularly pronounced.

January 13th, 1911.—For the following careful note regarding the patient's cardio-vascular system I am indebted to my medical colleague at the Queen's Hospital, Dr. Sydney A. Owen.—*Patient lying down.*—Some diffuse pulsation at root of neck, but no undue venous distension. The maximum heart's apex-beat best seen and felt in the fourth space immediately beneath the nipple ($2\frac{3}{4}$ in. from mid-sternal line). The impulse is more diffuse than is normal for a child of her age, and is slightly more forcible than natural. Slight epigastric pulsation. The right limit of the cardiac dulness is at the right edge of the sternum; the upper, at third rib; and the left obliquely, a little outside nipple. On auscultation at the apex, the first sound is shortened, sharper than natural, and accompanied by a low-pitched systolic *bruit*, faintly conducted to the axilla. The second cardiac sound is a little

accentuated. An imperfectly reduplicated sound at the pulmonary base. The second sound is natural at the aortic base. The heart's action is regular. Pulse, 112; soft, fair volume, tension low, with slight Corrigan character. Blood-pressure (obliterating pressure) 120 mm. Hg. Vessels, no thickening. *Patient sitting up.*—The apex-beat (maximum) is now seen and felt just external to the nipple. The systolic murmur is less audible. Both lying and sitting, the systolic bruit, although heard best in full inspiration, can be heard also during full expiration. The murmur cannot be heard in the back. There are no signs of auricular enlargement, as evidenced by signs of pressure on the left apex. Ewart's auricular dulness is natural. In the left lateral position the heart shifts normally, and the forcible character of the impulse is best appreciated. The carotids show no difference on the two sides. The splenic dulness is well marked. Slight irregular fever; no nodules. Diagnosis: *Mitral regurgitation with slight dilatation and associated hypertrophy of the left ventricle. There is no positive evidence of mitral stenosis. The right heart is slightly enlarged. The condition appears to be progressive. No evidence of infarction elsewhere.*

January 19th, 1911.—The left eye has now recovered enough sight to distinguish between light and dark. The œdema has practically disappeared, the retinal arteries are rather small, and the optic disc is atrophic.

March 2nd, 1911.—Left vision = p.l. in outer and inner fields, but not above or below. Pupil has little if any direct action to light, but its indirect action is greater than that of the right pupil. Optic disc is papery-white and well-defined. Retinal arteries and veins smaller than those of the other eye.

Remarks.

It is now widely recognised that the classic picture of the fundus first described in the year 1859 by A. von Graefe (*Arch. f. Ophthal.*, Bd. I, S. 136) may be due to causes other than embolism of the central artery of the retina. Among these may be mentioned arterial thrombosis, local disease of the vessel walls, spasm or cramp of the artery, and (possibly) hæmorrhage into the sheath of the optic nerve.

The evidence in the foregoing case points to embolism as the cause of obstruction. The child had suffered probably from rheumatism and certainly from scarlet fever and measles, three conditions any one of which is recognised as a competent cause of endocarditis. Dr. Sydney A. Owen's report renders it beyond a doubt that a valvular lesion of the heart existed in my patient, and what is still more significant, that *the cardiac lesion was progressive.* The failure of vision was discovered on awaking one morning, and it is practically certain that it had occurred during the night's sleep. In brief, the history of rheumatism and the other ailments, the existence of a progressive valvular lesion, the sudden failure of sight without cerebral accompaniments, and the ophthalmoscopic picture combine to render it almost certain that this was an instance of embolism of the central artery of the retina.

Arterial thrombosis appears to be excluded, since there had been no prodromal attacks in either eye. The slight giddiness and frontal headache experienced by the patient for about a year prior to the blindness were amply accounted for by the error of refraction that existed, together with the character of the girl, who was inclined to be somewhat emotional and nervous. It is not necessary to assume cerebral thrombosis in explanation of these common symptoms. Again, thrombosis of the central artery of the retina would be scarcely likely to occur in the absence of local endarteritis. Chronic disease of the blood-vessels, however, is extremely rare in children, if, indeed, it can be said to occur apart from syphilis or granular contracted kidney. The urine in my patient was free from any change suggestive of the existence of kidney mischief. She presented no signs of hereditary syphilis, either on clinical or bio-chemical examination. As excluding vascular disease it is to be mentioned, too, that the retinal vessels of the unaffected eye showed no signs of disorder capable of recognition with the ophthalmoscope. Finally, neither the radial nor any of the remaining palpable arteries could clinically be regarded as otherwise than normal.

Spasm of the arterial walls as a cause of the symptoms may also be put on

one side, inasmuch as the ophthalmoscopic appearances lasted too long to render that explanation acceptable. Besides, in the absence of endarteritis, spasm would appear to be a very unlikely event.*

With regard to the last possibility, hæmorrhage into the sheath of the optic nerve, it is doubtful how far that condition would account for the ophthalmoscopic appearances commonly believed to be the result of "embolism of the central artery." At all events, there is no pathological warrant for the assumption. The researches of Gonin (*Annales d'Oculistique*, February, 1903) render the contingency something more than merely doubtful, despite the *dicta* of some of the earlier ophthalmic surgeons—in particular, Magnus.

A chronic vascular disease, as already stated, is extremely rare in children, except perhaps as the result of syphilis, which can be positively excluded from the present case, despite the large infantile mortality (amounting to 66 per cent.) and the fact that the child's mother has suffered from three miscarriages. The family history, for that matter, is more suggestive of tubercle than of syphilis. On the other hand, endarteritis, as everybody knows, becomes more frequent as age advances. In correspondence with this, we find the symptoms of obstruction of the central artery of the retina, irrespective of precise cause, to be rare in childhood and more frequent as age advances. Does this not indicate the relative importance of vascular disease as the effective cause of obstruction and the relatively small part usually played by embolism? In other words, are not most instances of central obstruction in children due to embolism, and in adults, on the contrary, to disease of the retinal vessels, acting either by itself or as a cause predisposing to thrombosis or to cramp of the vascular wall?

The very rarity of obstruction in children, then, may perhaps be regarded as indirect evidence of the preponderating importance of chronic endarteritis (arterio-sclerosis) as the cause of obstruction of the central artery of the retina in the common run of cases.

CLINICAL MEMORANDUM.

A CASE OF LEAD OPACITY OF THE CORNEA TREATED BY THE APPLICATION OF A SOLUTION OF SULPHURETTED HYDROGEN.

BY

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P. ANEUPURANAMMA, a female Hindoo, *æt.* 35 years, was admitted to the Government Ophthalmic Hospital, Madras, on November 19th, 1910. She stated that fourteen days ago she had an inflamed eye, for which she used drops made by dissolving sugar of lead in rose water. She made three consecutive daily applications, and on the fourth day she noticed a white patch on her eye. The symptoms of inflammation had meanwhile been relieved by the medicine.

Condition on Admission.—There was a hexagonal white patch occupying the lower portion of the cornea, and measuring more than two-fifths of the whole area of the cornea. It showed clear evidence of having been laid down in three layers as the ulcer healed from the periphery towards the centre; for

* That spasm may, in fact, occur is amply shown by a case reported by a A. H. Benson (*Trans. Eighth Inter. Ophthal. Congress*, 1894, p. 81). One portion alone of the visual field, as a rule, was affected in this case.

the outermost zone, though dense and white, was less so than the next, whilst the innermost area, which took up a full three-fourths of the whole, was so densely white, that one was struck by it the moment the woman entered the out-patient rooms. It looked as if a large plate of glistening enamel had been let in under the cornea. Both the ocular and the palpebral portions of the conjunctiva were congested, but the eye was otherwise normal. The patient complained of tenderness on manipulation.

Treatment.—On November 26th, the ulcer was scraped freely, but it did not seem possible to reduce the opacity. The conjunctival sac was then flushed with an aqueous solution of sulphuretted hydrogen, and the fluid was freely dabbed on the surface of the ulcer with wool swabs. The white patch at once turned brown.

After-course.—The patch was no longer noticeable when the patient approached one, although it was still quite obvious on close examination. We proposed a repetition of the procedure, but the patient was quite satisfied with the alteration in her appearance, and went out, at her own request, on December 10th. She has not since appeared.

Remarks.

Lead opacities are comparatively rare in Madras at any time, but the one described in this communication was peculiar both in its extent and its density. The woman does not appear to have observed the effect of the first two instillations, obvious as it must have been.

I am not aware that anyone has previously suggested hiding the opacity by turning it brown under the action of sulphuretted hydrogen, although possibly many have done it.

NOVELTIES.

A REVERSIBLE BI-FOCAL GLASS.

BY

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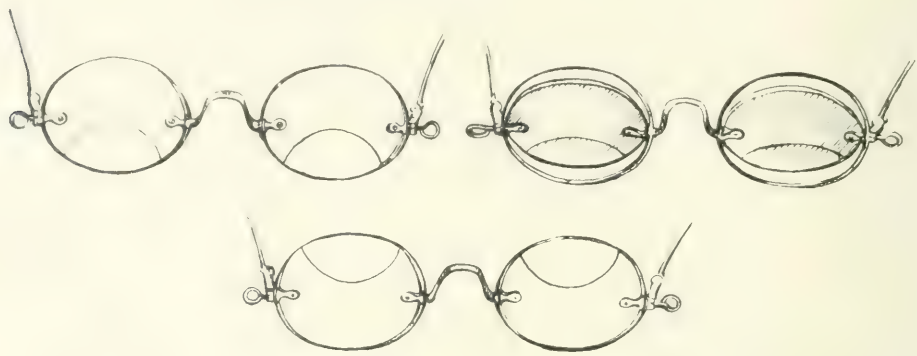
I have read with much pleasure Dr. Maddox's suggestion for marking the upper margins of the segments in bi-focal glasses, and so modify the great inconvenience experienced by some wearers. It occurred to me that an idea of mine that prompted me to have a reversible bi-focal glass made might interest the readers of THE OPHTHALMOSCOPE. For some years I have worn +1·75 for distance and +4·75 for close vision. The inconvenience of always carrying two pairs of glasses at last became intolerable, so I had a pair of bi-focal glasses made. I found these very disappointing; it was quite impossible for me to walk about in them. I was regretting having made the investment, when the above idea suggested itself. I unscrewed the frames and released the lenses; these I turned upside down, re-screwed the frames, and tried them on. To my surprise, I found my distant vision quite uninterrupted, now that the segments were at the upper part of the frame, and they could only be seen by looking upward at a very acute angle. I then realized I had only to make the lens work on a trunnion in order that I might arrange my glasses for close or distant use as might be required. The diagram will, I hope, show how this has been effected. Each lens has been drilled near its inner and outer border, in order that a small spindle may be attached. These work in a well-fitting hole, drilled in the outer and inner part of the frame.

Both outer spindles are considerably longer than the inner, and these extra lengths are utilized by turning them into an approved shape in order that they may be readily grasped by the thumb and forefinger of each hand, and so turn the lens half-way round, and thus having a ready method of getting the segment from the lower to the upper part of the frame, and thereby allowing the wearer to walk in comfort and safety, and again to the lower part of the frame when close vision is required.



In conclusion, I am anxious to add that I have worn the original pair ever since, and, if I may be pardoned for saying so, have found them "ideal." The simple method of turning is most effective. Messrs. Bowing and Co., 281, Regent Street, London, have just made me two pairs, which are much more artistic in appearance than mine, the small handles by which the lenses are turned have been hinged and lie flat on the wings.

The accompanying diagram represents a reversible bifocal glass that can be used for all cases, except those which require the cylinder in an oblique axis, for these I have had a frame made in which the lenses are turned in such a manner that the axis of the cylinder is not altered.

A NEW PERIMETER.

BY

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The disadvantages of the arc perimeter for all except determinations of the peripheral portion of the visual field have long been recognized. The uselessness of the blackboard, or one plane perimeter, for the peripheral portions of the visual field are also too apparent. To combine the advantages of the arc perimeter and the flat perimeter we had constructed, about two years ago, a modification of the ordinary umbrella which presents a hemispheric (or almost hemispheric) perimeter that satisfies all demands. Peripheral determinations are easily made, and for mapping out central or paracentral scotoma or enlargements of the normal blind spot, we have found it vastly superior to the arc instrument. Pins carrying white, red, blue, and green heads are stuck through the cloth, and may be left in the instrument indefinitely until time can be found to plot the fields or scotoma. The appliance is extremely light, may be collapsed like the ordinary umbrella, and carried about in the surgeon's bag. For bedside use we have found it much more useful than the Schweigger hand instrument. It has been in daily use in our practice for the past two years, and has met every demand made upon it.

REVIEW.

ON HETEROCHROMIC CYCLITIS (HETEROCHROMIA IRIDUM), WITH AN ACCOUNT OF AN ANOMALOUS CASE.

BY

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HON. OPHTHALMIC SURGEON TO THE COVENTRY AND WARWICKSHIRE HOSPITAL, AND TO THE WARNEFORD, LEAMINGTON, AND SOUTH WARWICKSHIRE GENERAL HOSPITAL.

HETEROCHROMIA iridum is found in two forms. In one the heterochromia is merely an anomaly, and in the other it is a symptom of a definite disease, which has a perfectly characteristic train of symptoms. This latter variety is best designated *heterochromic cyclitis*. Fuchs has suggested the term "chronic cyclitis with discolouration of the iris," and Malgat and Bistis call both kinds "chromo-hetropy," reserving the word "heterochromy" for those cases in which two parts of the same iris have different colours.

History.

Attention was first drawn to the condition by Jonathan Hutchinson[1] in 1869, who described three patients who had one eye blue the other brown. In one case he noted anisocoria, the pupil of the blue iris being only half the size of that of the brown. The other two patients had cataract in the blue eye.

For twenty years the disease appears to have sunk into oblivion. But in 1889 Sym[2] and Marcus Gunn[3] published fresh cases. Sym's ten patients, with two exceptions, were all in the third and fourth decades of life, and most of them had dark hair. It was usual for the colour of one eye to correspond to the mother's, the other to the father's eye. In one case the father had heterochromia iridum. Sym noticed that the blue eye was often affected with opacities in the vitreous, with choroiditis, and with cataract. He also mentioned glaucoma as a complication of three cases. In one it was associated with serous iritis; in another it followed a needling operation.

Marcus Gunn described a case in which one eye was like the mother's in colour, the other had the colour of the father's eye. The blue eye developed cataract. Hair and eyebrows were normal.

In the same year, 1889, Malgat[4] published a paper on the subject, and followed it by two others in 1895 and 1899. He recognised the relationship between depigmentation of the eye and the incidence of cataract, and although some of his theories must be modified in the light of more recent knowledge, he was the first to make a real study of the disease Eight of the nine cases cited in his first paper developed cataract in the fair eye; all his patients were brunettes; and he could obtain no evidence of heredity.

Bistis[5] published two cases in 1898, one of which was uncomplicated, while the second developed cataract. The parents of both cases had different coloured eyes, blue and brown.

Fuchs[6] now entered the field, 1906, and gave a complete account of the disease in all its bearings.

Lagleze[7] discussed the question of heterochromy in his paper on the albino eye.

Weill[8] in 1904 published seven cases. Four of them had cataract in the fair eye, and six of them had symptoms of chronic cyclitis in the fair eye.

Lutz[9] made the disease the subject of his Inaugural Dissertation for the degree of Doctor of Medicine, and wrote the most complete account of the disease in existence. I have made full use of his valuable work in writing this paper. Working in Professor Haab's *clinic* at Zürich, he has been able to collect twenty-three cases, and to these in a second paper he adds the details of seventeen more.

Galezowski,[10] in an article summing up the whole subject, points out that in spite of all that has been written, the disease is not yet well recognised. Recent books either ignore or scarcely mention it. van Duyse[11] gives only a short paragraph to it, and that a poor one. Dor,[12] however, in the same work, the French Encyclopædia of Ophthalmology, devotes a paragraph to the consideration of cataract following heterochromia iridum. He cites a case of a man whose irides had the same colour until he was ten years old. Little by little one eye became blue. At the age of twenty both eyes had equal vision, but ulimately cataract developed in the blue eye. He adds: "It would seem that side by side with congenital heterochromy there is a hitherto unknown disease which commences with depigmentation of the iris and ends with cataract."

In Axenfeld's recent *Lehrbuch* nine lines are devoted to the disease. Römer, in his *Lehrbuch*, does not even mention it.

Ætiology.

It is not possible to make an *absolute* classification between the uncomplicated congenital form and the complicated form, for some of the simple congenital variety, although not complicated with cyclitis, do manifest abnormalities. Thus, the blue eye has often a smaller pupil than the brown one, and the blue iris may show iridodonesis. There may also be other symptoms of paralysis of the sympathetic. Physiological albuminuria is present in a considerable proportion of the cases. It is worthy of remark that heterochromia iridum is occasionally seen in cats. I know of one instance in which a cat had a blue eye and a green eye. The cat was a white kitten, but I have no further details. A second case in cats has been reported to me, but I am unable to confirm the truth of the statements received.

The disease is a rare one. Lutz found that it formed only 0·2 per cent. of the cases at the Zürich *clinic*. I have seen only two cases—one simple, one complicated—among 6,000 patients, a percentage of only 0·03. Lutz states that at least half the cases are complicated with cyclitis. Fuchs gives the proportion of men to women affected as 60 per cent. to 40 per cent. Occupation has no influence, and, with the exception of Sym's example, there is no evidence of hereditary transmission. In most of the patients the heterochromy was noticed at birth—*i.e.*, was congenital. In some of the acquired examples the blue eye became brown, but more usually the brown eye became blue. The change may either be a development or a loss of pigment.

The cause of the disease is unknown, but the association with paralysis of the sympathetic in many of the examples of the disease points to the influence of tropic changes. We may thus compare the chronic cyclitis in heterochromia iridum with the iritis and irido-cyclitis which are occasionally observed in herpes ophthalmica.

Symptoms.

We shall now deal exclusively with the complicated type of the disease, for which I suggest the term "*heterochromic cyclitis*."

The change in colour may last for several years before any further complications are noticed, but sooner or later, the patient complains of slight loss of vision in the blue eye. There is never any pain, and no injection of a marked character. There may be occasionally a slight ciliary blush. The disease is associated with no general dyscrasia, although the patients generally look "out of sorts." As we have stated, slight transient albuminuria is common. Lutz found it in six patients out of fifteen examined. He also noticed in one case *hemiatrophia facialis* on the side of the blue eye.

An examination of the eye reveals in all cases fine keratitis punctata, which soon covers the whole posterior surface of the cornea. In other examples it is confined to the lower sector. Exudation into the vitreous then occurs, and soon in many cases the lens becomes cataractous. The cataract is often finely punctate. It may mature rapidly or slowly. According to Galezowski, the cataract is soft and has no nucleus. In my own case it was hard, like an ordinary senile cataract. The results of extraction or discission are generally most successful. My own patient left the hospital on the third day with an uninjected eye, and got 6/5 vision. (He was discharged at this early date because a highly septic case was admitted into the same ward.) Hutchinson and Mary would give a more guarded prognosis as to the result of extraction.

Glaucoma is a complication which occasionally appears. Sym noticed it in three of his ten patients. Lutz records two cases, and my own constitutes another example. Both Sym and Fuchs mention choroiditis as a symptom, but Lutz has not seen it. Slight optic neuritis may occur. Iritis is very uncommon, but Sym mentions it.

Prognosis.

This is, on the whole, bad. The disease is very slow, and may extend over years, even decades. It generally, in fact, almost always, starts in youth. My own case has practically lost his sight through the advent of chronic glaucoma.

Case.

So far I can find, no case recorded in which the cyclitis affected the darker eye. In fact, all authors without exception insist that the fair eye is *always* affected. In my own case, which I now cite, the reverse was true.

H. D. ——, aged 36, a machinist, came to the Coventry Hospital on July 29th, 1908, complaining that the sight of his right eye was getting dim.

History.—He has had no severe illnesses, but has never been very strong. His wife positively assures me that she is certain that when she first married him, ten years ago, his right eye was grey-green, his left eye blue. He himself can assign no certain date to the change in colour. The dimness of vision is quite recent, a matter of days.

Condition when first seen.—Patient is an anæmic, weedy-looking man. He works at the Coventry Ordnance Works at boring naval guns. He has light brown hair and eyelashes. The left eye is amblyopic, and there is a left convergent strabismus of 30°, dating from childhood. The left iris is a medium-tinted blue, with no trace of brown or green. The pupil is of normal size and reacts normally. The left fundus is normal in every respect. L.V.=fingers at 3 metres, not improved; in other words, the left eye is a squinting, amblyopic eye. The right iris is a raw-sienna colour, a yellowish,

greenish brown, the predominant hue being yellow. The pupil is irregular, and there are some fine posterior synechiæ. There is a very slight pericorneal blush. The iris tissue is glossy and normal in appearance; there are no dilated vessels or other evidence of active iritis. The pupil responds badly to atropine, and no fundus details can be made out, because the vitreous is hazy. The tension in each eye is normal. No keratitis punctata was noted. The patient was given atropine.

Progress.—Patient attended badly, but on Aug. 29th he was seen. It was found that all the posterior synechiæ had become absorbed, and the pupil was round, reacted freely and dilated fully and regularly with atropine. There was fine keratitis punctata covering the whole of the posterior surface of the cornea. There was a diffuse haze of the lens, and the fundus could not be seen. No ciliary injection. Good perception of light and perfect projection, R.V.=5/15. L.V.=3/50. Tension each eye normal.

October 21st.—The right lens is now mature; there is a grey homogeneous cataract. V.=hand reflex, Projection good.

October 22nd.—Patient was admitted and a preliminary iridectomy of medium size performed. No pain was felt.

October 27th.—Patient discharged. The eye did well, and never showed any sign of general injection after the operation.

After this date patient was seen occasionally. There was no rise of tension and no ciliary injection, but the keratitis punctata increased in amount.

February 3rd, 1909.—Patient readmitted.

February 6th.—The right lens was extracted by the ordinary 3 mm. flap operation with conjunctival flap.

February 8th.—There is no injection of the eye, the anterior chamber has re-formed, and the wound is free from iris and capsule. Atropine instilled.

February 10th.—The pupil is fully dilated, and the eye looks as though no operation had been performed. As a septic case had been admitted into the ward, I sent my patient home.

March 4th.—V.R $c.\frac{+1\,1\,0}{+2\cdot0}$ axis horizontal = 5/6 one letter. There is still much keratitis punctata and vitreous haze.

March 14th.—V. 5·5.

May 5th.—V.=6/6 partly in his spectacles. Reads J.i. Still much keratitis punctata. Tension normal.

The patient now returned to his occupation as a gun borer, working on 13.5 inch naval guns. He continued to do this work for nearly a year. I saw him occasionally, and found that he had as much keratitis punctata as before. His vitreous haze had cleared up. The fundus was normal. No cupping of the disc. No return of the slight iritis he had when first seen. His vision once reached 6/5, but was generally 6/6 or 6/5 partly.

April 25th, 1910.—Came to the hospital complaining that he could no longer do his work as a gun borer.

$$\text{V.R. } c.\frac{+\ 10}{+\ 1.5} \text{ axis horizontal} = 5/10 \text{ partly}$$

There is a deep glaucomatous cup. No change in the keratitis punctata; haze of vitreous still present. Tension normal.

May 5th, 1910.—R.V. in spectacles=5/10. *May 18th.*—R.V. in spectacles =5/10. No injection.

July 4th.—Now has a deep glaucomatous cup on right side. Tension absolutely normal, rather softish than hard. R.V. in spectacles only 6/36. There is no doubt that in spite of the low tension, the eye is in a state of chronic glaucoma.

July 25th.—Tension Rt. + 1/2. Cup deeper. Admitted to Hospital for trephining operation.

Operation.—This was of great interest as illustrating an accident which may happen in the Freeland Fergus operation, one which has also occurred in the practice of two eminent surgeons of my acquaintance. As an extraction had been done upwards with a conjunctival flap, I was doubtful whether I should be able to turn back a conjunctival flap in an efficient manner, and so I decided to trephine below. I had two trephines, one of Stephenson's and another of my own pattern. I do not know which was the worse, but with the aid of both of them, I eventually managed to trephine the sclera. But I was unable to find the disc! The iris prolapsed through the aperture, and so I did an iridectomy. Then I discovered the disc lying on the vitreous body. With Liebreich's forceps I managed to grasp it, but it required a regular hard drag to extract it. Then I discovered that it was still attached at the corneal side and had hinged back, like the operculum of a trap-door-spider's nest. Had I failed to remove the disc, I had undoubtedly lost the eye. After the operation, the eye remained red for some time.

August 10th.—Discharged. Fundus well seen in every detail. Tension normal. Considerable chemosis in region of wound.

$$\text{R.V. } c \begin{matrix} +10.0 \\ +1.5 \text{ axis horizontal} \end{matrix} = 2/60.$$

August 15th.—T. normal. Eye remains injected. Slight œdema over the trephine hole. R.V. = 2/60. Put on atropine.

August 31st.—R.V. = 2/60. Redness much less. T. + 1/4. Some œdema over trephine hole. There is a medium-sized coloboma upwards, a small V-shaped one downwards, with a bridge between the two.

Oct. 24th.—Eye now devoid of injection. R.V. = 2/60. Tension quite normal. No œdema over the trephine hole, which has apparently healed up solidly! Disc deeply cupped. The keratitis punctata has *at last* cleared up after persisting from the very beginning of the cyclitis. T. + 1/4.

Nov. 7th.—There is again slight œdema of the conjunctiva over the trephine hole. The tissues pit when pressed with a probe. T.R. + 1/2. T.L. normal. R.V. in spectacles $= \frac{2.5}{60}$ No injection. All keratitis punctata gone.

Although the aperture continues to filter and there are two iridectomies, the tension is still raised and the vision is less than 6/60. Patient has had to give up his work as a mechanic, but he still comes to the Hospital alone.

May 15th, 1911.—In reply to a letter, patient came to see me. I found that he had R.V. in spectacles $= \frac{1.75}{60}$ There is now no trace of injection. There is a little fine keratitis punctata. The iris is the same colour as before, but it is quite normal in texture and sheen. The two pupils react sluggishly to light. The disc is cupped to the extent of about 2 D., the edges of the cup are sharp, and the vessels are lost as they dip over the edge. The lamina cribrosa is unduly visible and the whole disc is pale. The tension is + 1/4. The conjunctiva over the trephine hole is not œdematous, but it pits when touched with a probe over a semi-circular area of about 0.5 centimetre radius. In spite of this free filtration, the tension of the eye is slightly raised. He has not lost any vision in the last six months. He has given up his work as a mechanic, but he and his wife keep a small shop.

Remarks.

I am well aware that the view may be advanced that this case was not an example of true heterochromic cyclitis. The cyclitis may have been the first act in the scene, caused by his teeth, which were in a bad condition. Against this view is the fact that his symptoms had lasted at most a few weeks only, whereas the heterochromia had been present for ten years on his wife's evidence, and if she did not know the colour of her husband's eyes, who should? Again, I find that one of the children of the marriage had a spina bifida, which points to a tendency in the strain to the production of abnormalities. Apart from the fact that the blue eye remained the healthy one, although amblyopic, the case corresponds exactly with all the published cases of the disease. We have a low-grade cyclitis, associated with copious precipitates upon Descemet's membrane, the rapid development of cataract, the very favourable result of the extraction, and, finally, the glaucoma following an absolutely normal extraction where there was not a suspicion of encleisis of iris or capsule.

Between the iridectomy and the extraction the patient went to Moorfields, and was seen by Mr. C. Devereux Marshall and Mr. A. S. Morton, who both advised him that the lens could most probably be extracted without any increase of his cyclitis.

In any case, whatever be the true ætiology, the case is interesting as illustrating one of the most serious complications of the trephining operation, and showing that a filtering scar does not suffice in all cases to reduce even such a slight rise of tension as was present in this eye. I may add that I have another case of chronic glaucoma which remains hard in spite of a freely filtering scar following trephining.

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TRANSLATION.

ON KERATOPLASTY.*

BY

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THE replacement of an opaque cornea by a transparent one would seem so marvellous a result that the solution of this problem has for long tempted curiosity and aroused research among numerous experimenters.

Attempts have even been made in the past to insert, like a bull's eye, into the corneal framework inert substances, such as glass. It is surprising that even in 1789, Pellier de Quengsy should have had such a notion, but it passes comprehension that this idea should have been taken up by other oculists, and those not the least known, more than fifty years afterwards.

Bold indeed, but not senseless, was the project of Resinger, in 1818, of replacing in its entirety an opaque cornea by a transparent one. After numerous fruitless attempts by himself and others, Wolfe, long afterwards, in 1873, gave the hope of better results by inserting flaps made of the whole thickness of the cornea. In this method the anterior chamber was opened, but portions of conjunctiva were left attached to the corneal flaps, in order to facilitate coaptation. Although the results of these experiments were relatively good for a time, complete success was never obtained.

von Hippel, who has always been interested in the question, although, indeed, he made some regrettable incursions into the domain of the impossible —such as his idea of the insertion of a glass into an opening in the opaque cornea—took up again, in 1879, and with relative success, the method of Walker. Walker's plan is to remove only the opaque layers of the cornea, leaving intact the deep parts which remain transparent; that is to say, without opening the anterior chamber. For the removal of the leucomatous portion he invented a special trephine, which has the double advantage of rendering easy the dissection of the flap and of obtaining a disc of grafting tissue perfectly adaptable to the prepared surface.

Thus there are two methods in vogue: that of Wolfe, in which the whole thickness of the opaque corneal flap is replaced, the anterior chamber being open, by a flap of transparent cornea of the same shape and having conjunctiva attached to it; and that of von Hippel described above.

Some more recent attempts with these two methods have hardly given definite results; yet they represent progress.

The conclusions of G. S. Souroff (*Thesis of the Academy of Military Medicine of St. Petersburg*, 1903-1904) are not encouraging. Experiments undertaken with various kinds of animals showed him that after transplantation of the cornea no true incorporation of the graft took place, but only a temporary soldering of the foreign cornea to the tissues, and that ultimately the transplanted part disappeared by a process of slow resorption through the influence of cicatricial fibrous tissue formation.

Francis Valk (*American Journal of Surgery*, January, 1908) has three times grafted a rabbit's cornea on a human eye. The last of his observations, and the only one published, concerns a young woman with a very opaque leucoma. The leucomatous part was trephined after the manner of von Hippel, and the

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gap filled with a similar flap from a rabbit's cornea. Unfortunately, the author does not give us the after-history of the operation.

More recently Fernandez Balbuena (*Archivos di Oftalmologia*, December, 1910) has published an interesting article on this question. Of this we shall give a broad *résumé:*

In order that a transplanted cornea may preserve its transparency, it must be well nourished, and it must acquire sensitiveness. In a number of cases the first condition is easily realised; the second is more difficult, for it implies the formation of a new nerve network becoming joined to that of the receiving cornea. It is not, however, unlikely that the transplanted flap may acquire a certain degree of sensitiveness.

In the opinion of von Hippel, who, until the present has had the most favourable results, the leucoma must not involve the whole thickness of the cornea, and the membrane of Descemet must be left intact.

Failures are frequent when the whole cornea is trephined. However, even under such conditions, a transparent flap has been obtained. The most recent observation is that of Zirm, who obtained transparency of a 5 mm. disc of cornea inserted into a leucomatous tissue. At the time when Zirm published, a year had passed since the operation had been performed with the human cornea.

But in very extensive leucomata the procedure of von Hippel is impracticable, whence the necessity for new methods.

O'Meare has obtained the transparency of whole corneæ of the dog transplanted to the human subject by refreshing (*en avivant*) the leucomatous surface down to transparent tissue without opening the anterior chamber, and by supporting the graft sometimes with sutures, sometimes with a bandage only.

O'Meare asserts that small grafts are more easily lost, and that one should not despair if the graft becomes opaque at first, for afterwards it may recover transparency.

In spite of such optimistic conclusions, most experimenters deny the possibility of heteroplasties, and at this day very few venture to employ animal corneæ.

Human corneæ from young individuals, obtained after enucleation of eyes with healthy anterior segments, or from the recently dead, are to be preferred.

In the case by M. Fernandez Balbuena, which concerned a dog operated on without trephining, the graft became opaque at first and recovered its transparency after applications of dionine powder and of jequiritol. The transplanted cornea had no sensibility. Ten months afterwards, there was a slight haze with vascularisation in the supero-external quadrant; the remainder was transparent.

Meantime, the author, having learned about the experiments of Teich, who affirms that, after a time, the grafts are absorbed and replaced by the corneal tissue on which they have been placed, thought that something of this kind had taken place in his case. Sections showed, to the naked eye, that the thickness of the cornea was less than that of a healthy eye; a fact which made him think that the graft had suffered a partial absorption and had been reduced to a fine pellicle.

Of the two dogs in which the author performed trephining and sub-conjunctival grafting, in one the absorption of the graft was total. Ten months afterwards in the cornea upon which the graft had been made, the trephined loss of substance, closed by leucomatous tissue, could be clearly seen. In the other dog the resorption was only partial.

Since, however, the most important problem in keratoplasty is to obtain

the transparence of grafts which comprise the whole thickness of the cornea, F. Balbuena has repeated his attempts at subconjunctival insertion, with corneal openings of different diameters, and he has observed that small trephinings close rapidly, that the sub-conjunctival protection is sufficient to maintain the transparence of the graft, that this has persisted in several cases for eight days, and that if, by any mischance, this protection failed, the graft became opaque.

Another cause of opacification is the increase of tension which is sometimes produced after the anterior chamber has formed. The flap, under the influence of the aqueous pressure, bulges and ends by becoming opaque. With rabbits, also, one must reckon with frequent infection. In short, up to the present, the author has obtained no definite result by trephining the whole thickness of the cornea.

In his first work, the author thought that the graft ought to be larger than the receptive cavity. He has now given up this idea.

F. Balbuena has not returned to the attempt at grafting without trephining, but continues to think that by the procedure of conjunctiva-covered grafts without opening the anterior chamber, one may hope to obtain the transparence of whole corneæ. Formerly he counted upon dionine and jequiritol to bring back transparency, when it was lost in the first few days, but he has given up the idea—at any rate so far as concerns jequiritol, which produces too violent a reaction. Dionine is possibly of some use.

Further attempts must be made, says Balbuena at the close of his work, before the procedure can be applied to man, and he is of opinion that for man the human cornea must be used, for, although Wolfe-Schaler, O'Meare, and others advise the employment of the dog's cornea, most experimenters deny the possibility of heteroplasties.

Almost at the same time, but a little earlier ("Transplantations cornéennes," *Klin. Monatsbl. f. Augenheilkunde*, Oktober, 1910), Lohlein had formulated the same conclusions (analysis in *La Clinique Opht.*, 10 janvier, 1911, page 28, with figures). He employs a kind of fork with cutting ends with which he marks out the size of the flap. Then he detaches it by means of a fine Graefe knife in the manner shown in the figures appended to the analysis. A very important point is the fixation of the flap. Once the flap has been properly laid on the denuded surface of the cornea it is stretched by its sclero-conjunctival extremities ; the two ends are fixed into the bared corneal limbus by three or four sutures on each side. It is, in fact, the method of Wolfe as to the shape of the flap and adherent conjunctiva, but without opening the anterior chamber.

A great part of the desiderata of authors seems to be fulfilled by the results recently obtained by Magitot ("Sur la possibilité de conserver en dehors de l'organisme, à l'état de vie ralentie, la cornée transparente de l'œil."—*Société d'Ophtalmologie de Paris*, 7 février, 1911).

"I have been struck," he says, "by the fortunate result of certain observations on transplantations of the cornea from man to man. There are at the present time a dozen such cases in the literature. I have also remarked how difficult it is to realise two conditions which are essential to the proper management of this operation of keratoplasty, namely, the possession of healthy tissue to furnish the graft, and the necessity of having two patients on the scene at once. Then, there is the necessity of being quick. Thus I have been led to the abolition of one of these factors. One must be able, without hurry, to preserve the cornea in a healthy condition. We all know how quickly this tissue becomes hazy, and how rapidly its epithelium desquamates after death. Is it possible to preserve it *in vitro*?"

Well, Magitot has come, after numerous trials, to the method of immersing complete rabbit eyes in a hæmolysed serum drawn from the blood of another rabbit and kept at a proper temperature. This temperature is of prime importance. At zero or below it the cornea becomes opaque. "At the temperature of melting ice the cornea remains remarkably clear for from twelve to fourteen days; then it begins to become hazy in places, and its epithelium desquamates at the least touch. For some time I have noticed that the optimum temperature is not 0°, but should lie between 5° and 8°. Eyes preserved in this way have a remarkable amount of tonus and their media are so clear that it is quite easy to see the optic nerve head by diascleral illumination. One gets the same impression as from an eye that has been enucleated for two hours. Again, I am persuaded that the survival-time of twelve to fourteen days can be exceeded. Even as it is, by changing the liquid medium periodically every five days, I have obtained very good results. I have, among others, an eye which has been preserved for twenty-five days. The cornea is perfect. Unfortunately, the lens began to become opaque on the twentieth day."

In order to prove their vitality Magitot grafted pieces of these corneæ on to rabbits' corneæ. He excised down to, but avoided injuring, the membrane of Descemet. He obtained in this way and in a very short time, a complete adhesion, and, what is of greatest importance, without any opacity of the graft.

"At the end of twenty hours, when the wound is exposed, the fragment is seen to be looking well, and fluorescein does not indicate any loss of epithelium. At this time the linear edges of the wound are quite visible. In a fortnight they are completely filled in. Towards the fourth week it is quite difficult to define the situation of the graft without focal illumination. At the end of two months it is so little perceptible that oblique illumination is required to show up the little milky line which indicates the edge of the operation wound."

We are, then, on the threshold of a great advance, since, should occasion arise, we shall easily be able to have at our disposal the corneæ of animals or of human beings ready for grafting.

The experiments of Magitot show us how easily union takes place as between rabbit and rabbit. Will it be the same from animal to man? One would fain hope so. In any case it is most probable that the success will be at least as great when operating from man to man.

The actual operation remains for consideration. Up to now, more especially since the results of Magitot have appeared, it has seemed that preference ought to be given to the Walker-von Hippel operation—that is to say, to the replacement of a part only of the thickness of the cornea. But will that always be possible? This is an operation which will be attempted, more especially in cases of total leucoma. In these cases can one be sure of finding still transparent a part of the deep portion of the cornea, however small?

Wolfe's method (replacement of the whole thickness of the cornea and opening of the anterior chamber) would be more certain from this point of view, but how much more aleatory as regards the success of the graft! Here we must lay our account with much greater possibilities of infection and with difficulties in the coaptation of the grafted portion. Perhaps one would find it advisable, in cases of total transplantation, to insert the graft furnished with large flaps of conjunctiva, or to cover the whole graft with a large conjunctival flap.

However that may be, on account of the much greater facilities for the practice of keratoplasty which the experiments of Magitot have given us,

and of the results obtained by him when operating from rabbit to rabbit, this operation seems to be freeing itself from the cloudy impressions left by previous attempts, and to be entering a better lighted path in which the end to be attained seems less remote. ERNEST THOMSON.

ROYAL LONDON OPHTHALMIC HOSPITAL.

Medical Treatment of London County Council School Children.

In May, 1910, a separate refraction department was opened for London County Council school children, and as the work in that department has now been carried on for over a year, the following account of its start and progress may be of interest to those who are about to undertake similar work elsewhere.

This Hospital is a voluntary hospital, free to the poor suffering from any affection of the eyes. But, owing to the action of the London County Council in urging children to obtain medical advice, children came in such large numbers on certain days, that the work in the out-patient department was disorganised. In order to provide for the medical treatment of London County Council school children, a special school children's department was built, and arrangements were made for the treatment of school children in that department on presentation of a green card issued by the school teacher.

One assistant has been in attendance daily, and the number of new cases has been limited to twelve a day. The number of children admitted in the year ended 16th May, 1911, was 3,185, the total number of attendances being 6,724. Spectacles were prescribed for 2,514 of these children, and 479 were transferred to the out-patient department for treatment. The average number of new cases daily was ten, and the average number of attendances daily was twenty-two.

The Education Authorities were arranging for the medical inspection of children in excess of the number for whom medical treatment was provided, and every day children attended here without green cards. To such children treatment was not refused, but was deferred. None of the children in excess of the agreed upon number are sent away until the assistant has seen them, and selected those who obviously require treatment; these children are admitted at once as out-patients.

The task of sending away the children in excess of the agreed upon number who did not obviously require treatment has been an unpleasant one, and we have had considerable correspondence, and several interviews, in order to solve this difficulty. A satisfactory solution has now been arrived at by the Education Authorities making provision for an increased number of children to be treated, and by arranging for an officer to come daily to the school children's department and see the parents of the children who attend in excess of the agreed upon number, and to issue green cards to them there and then. These cards specify the day and hour on which the child is to attend, and it frequently happens that owing to the failure of certain children to attend on their appointed day, some of the children who attend in excess of the agreed number can be seen in their place.

The London County Council officer referred to in the preceding paragraph also performs valuable work in checking the attendances and making a list of those—

(1) Children who fail to make their first attendance.
(2) Children who fail to attend as directed by the clinical assistant.
(3) Children who do not carry out the assistants' directions.

The Education Authorities now arrange for all these cases to be seen, and the work of the Hospital is thus followed up and completed.

The separate department for school children deals only with refraction cases. All the school children who require treatment are transferred to the out-patient department. This involves no delay to the children or parents, as cases for surgical treatment are promptly dealt with in the out-patient department. On the other hand, the fact that the refraction cases are seen in a separate department by assistants specially appointed for the purpose, is a distinct boon to the parents of the children, as they are saved the waiting, which is unavoidable in the crowded out-patient department.

At present there are five assistants appointed in the school children's department. Each assistant attends on two mornings a week, and sees about 1,000 new patients in the year. The London County Council pays the Hospital for the salary of these assistants at the rate of £50 per annum for one morning's attendance each week. It will thus be seen that each assistant receives £100 per annum for two mornings' work a week. The assistants are appointed by the committee of management of the Hospital, on the recommendation of the medical board, and they are all chief clinical assistants of the Hospital.

In addition to the above payments, the London County Council pays the Hospital 2s. per child. It has been found that this payment has met the expenses of administration of this department, which are somewhat heavier *per* patient than the expenses of the out-patient department, because it is a department separate and distinct from the out-patient department. Besides the assistants, the services of a nurse are required every morning; there is also a special porter for the department; the special registration of attendances, etc., is more elaborate than in the out-patient department, and absorbs a proportion of the clerical work of the Hospital; moreover, one of the dispensers and one of the opticians attend in the department from time to time, and thus save the children from having to go to the dispensary or the spectacle room. The special prices authorised to be charged to school children for steel spectacles, with curl or single sides, are as follows:—

Spherical glasses	1s. 9d.
Plano-cylinders	2s. 7d.
Sphero-cylinders	3s. 0d.

A considerable number of the parents are unable to pay for the spectacles, and the Hospital has been fortunate in receiving a grant from a charity in order to help these children to obtain the glasses prescribed for them.

ABSOLUTE PRECISION in visual lenses is made the standard by the Principals of this Establishment, and the supervision to ensure such precision is made a personal one. It has necessitated the design and use of special apparatus, and a feature is also made of decentering reading glasses in nearly all cases in accordance with the well-known tables calculated for comparative inter-pupillary distances.

Highly technical calculations are made to provide for the best forms of lenses, and combination of lenses in special cases, and the recognition and utilisation of this branch is rapidly growing.

With a staff of skilled workmen, a complete equipment of lens grinding machinery and fitting plant, the production of high class work is obtained.

The individual fitting of spectacles and eyeglasses, to produce the best interpretation of the prescription, has been carried to a high degree of perfection ; and it is necessary in order to maintain this perfection, that patients should be educated in one most important detail, namely, the necessity of making

periodical visits to have their glasses adjusted to meet modern exactitude. It was formerly considered an unnecessary and expensive proceeding, but here no charges are made, and such visits are desired. This attention to fitting is appreciated when the natural reluctance to make non-purchasing visits has been overcome. The obligation is not altogether on the one side when it is remembered that incorrectly fitting glasses are anything but a good recommendation.

The newer work in ophthalmic lenses comprises equitinted lenses and compound lenses for myopia, for anisemetropia, and for aphakia, where an equalisation in the size of the retinal images is indicated.

The ophthalmic surgeon is often confronted with the difficulty of being unable to get his experimental work carried out except at a great expense. This Establishment is well equipped for this class of work, having a capable staff under the control of an experienced technical manager, and correspondence is solicited in regard to any work of this character.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—CORNEAL IMMUNITY.

(1) **Miyashita.**—The participation of the cornea in pneumococcal immunity. (Die Beteiligung der Kornea an der Pneumokokken-immunität.) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg*, 1910.

(2) **Grüter, W.**—On the participation of the rabbit's cornea in general vaccine immunity. (Ueber den Anteil der Kaninchenkornea an der allgemeinen Vaccinimmunität.) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg*, 1910.

(3) **Gibb, H.**—On the question of the paricipation of the cornea in active and passive immunisation. (Ueber die Frage der Anteilnahme der Korrea an der aktiven und passiven Immunisierung.) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg*, 1910.

(4) **Schneider, R.**—On the method of action of immune pneumococcal serum. (Zur Wirkungsweise des Pneumokokkenimmunserums.) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg*, 1910.

(1) **Miyashita**, of Tokio, believes that the participation of the cornea in pneumococcal immunity is small. He experimented upon the cornea of over 200 rabbits in two ways: in the first place, he placed a drop of mouse heart blood bouillon emulsion upon the cornea which he had wounded with a needle, so as to get conditions analagous to those in which hypopyon-keratitis follows such an injury; secondly, in other cases he made intralamellar injections of cultures. Different strains of pneumococci were used, for all varieties do not produce hypopyon-keratitis in rabbits. He found that passive immunisation with Römer's Höchster serum or the Berne pneumococcal serum did not prevent the development of keratitis. If an homologous strain were used, the inflammation was delayed and mitigated. Heterologous strains had no action. Active immunisation by repeated injections of pneumococci had a definite action in inhibiting infection. T. HARRISON BUTLER.

(2) **Grüter**, of Greifswald, immunised rabbits by the subcutaneous and intravenous injection of vaccines. He found that the immunity was shared by the cornea, for often attempts to infect the cornea failed or the resulting inflammation was milder than in control animals. T. HARRISON BUTLER.

(3) Every ophthalmic surgeon who has injected the Römer-Ruffel serum in cases of ulcus serpens has in most of the cases noticed a "local reaction," consisting of a swelling and greyish-yellow discoloration of the ulcer. This shows that the serum has had a local action upon the cornea. This local reaction is followed by rapid healing of the ulcer. Römer has found that the same is true for infections caused by the Klebs-Loeffler bacillus. **Gibb**, of Griefswald, carried out a series of experiments upon the corneæ of rabbits, using bacillus suisepticus. The animals were immunised in three ways—actively, passively with homologous serum, and passively with heterologous

serum. The first two methods were successful, but to get any effect with the last method, large doses had to be injected into the veins.

T. HARRISON BUTLER.

(4) There is still much difference of opinion as to the nature of pneumococcal immunity. Neufels thinks it is due to specific tropines, bodies which are able to withstand heat and favour phagocytosis. Römer believes it contains antibodies which inhibit the multiplication of the pneumococci, thus enabling the bactericidal power of the normal serum to exert its action. **Schneider**, of Munich, determined to study first the nature of natural immunity to pneumococci. In this respect the guinea pig is useful, for it has a well-developed immunity to this micro-organism. If virulent pneumococci, which are able, even in minute doses, to kill a mouse, be injected into the peritoneum of a guinea pig they remain extra-cellular, but gradually become dissolved. This action is not caused by the active bodies in the serum, for the pneumococci grew splendidly in blood serum. The bacteriolysis is caused by a leucocyte derivative which the author calls "leucine." This is a thermophilic bactericide which can be secreted by the leucocytes when they are exposed to certain stimuli. By adding pneumococcus extract or washed pneumococci to guinea pig's leucocytes it was possible to get free these substances which are fatal to pneumococci. Further experiments showed that Neufels was correct in ascribing the immunity of pneumococcus sera to specific tropines. Experiments *in vitro* on leucocytosis with leucocytes from men, mice, rabbits, and guinea pigs showed that pneumococci were destroyed only when immune sera were added.

Pneumococcal immune serum does not cause increased leucine formation.

T. HARRISON BUTLER.

II.—THE LATE DEVELOPMENT OF MYOPIA.

(1) **Campbell, Munro (Barrackpore).—Myopia developing at 26 years of age.** *Ophthalmic Review*, September, 1910.

(2) **Becker, F. (Dusseldorf).—A case of late myopia development. (Ein Fall von später Myopie-Entwickelung.)** *Wochenschrift f. Therapie u. Hygiene des Auges*, 23 März, 1911.

(3) **Wirtz, Robert.—Late development of myopia with goitre formation and obesity at the same time. (Späte Entwickelung hoher Kurzsichtigkeit bei. gleichzeitiger Kropfbildung und Fettsucht.)** *Wochenschrift f. Therapie u. Hygiene des Auges*, 6 April, 1911.

(4) **Wirtz, Robert.—A further case of late development of high-grade myopia. (Ein weiterer Fall von später Entwickelung hochgradiger Kurzsichtigkeit.)** *Wochenschrift f. Therapie u. Hygiene des Auges*, 4 Mai, 1911.

(1) An expert signaller in a native regiment, six months subsequent to passing "first class," noticed failing sight. Vision with either eye was 6/18, and after retinoscopy with —3 D. sph. and —0·5 D. cyl. axis vertical was improved to 6/6. Fundi were normal. A. H. PAYAN DAWNAY.

(2) **Becker's** patient was a marine stoker who lay in hospital for 28 weeks with malaria when twenty years of age. After recovery he was in the navy,

passing the vision test on entrance, and boasting that his shooting was good. But two years later, he had some difficulty at the practices. Another attack of malaria led to his withdrawal from the service, but he continued for a number of years as an engineer in a steamer on the Rhine. In January, 1909, he had 6 D. of myopia, which by November, 1910, had increased to 9 D. in the right eye and to 7 D. in the left.

The author places the commencement of the myopia in the twentieth year; and considers its origin to have been due to the long-continued weakness following the malaria. If the vision tests for stokers in the German navy are similar to 6/9 or 6/12 early myopia may escape detection; and the dyscrasia would allow of the full development. W. B. INGLIS POLLOCK.

(3) **Wirtz**, of Düren, relates a case similar in almost all points to Becker's. The patient was a stoker in a paper manufactory except for his two years in the army when at the age of 22 he gained a mark for rifle shooting. He was also for a short time an athlete in a travelling circus. At the age of 35 he was ordered — 4 D. for each eye, and now required right — 6 D., left — 5,5 D., both with vertical cylinders, to obtain full vision. The goitre and obesity developed about the same time as the myopia. It is difficult to exclude also in this case the early origin of a slight myopia, which advanced at the same time as the general disease. W. B. INGLIS POLLOCK.

(4) The duplication of rare cases always astonishes one, as **Wirtz**, of Düren, says, in introducing this second instance of high myopia, developing late. The patient, 28 years of age, had been a saddler from boyhood, and in serving his country he had elected for the navy, from which he was discharged with full vision without glasses. On examination, myopia* of 10 D. and 11 D. was found for the right and left eye respectively; but there was no evidence of conus formation or atrophy around the optic nerve. Practically full vision was obtained in the right with —11 D., and in the left with —13 D. There was a strong family history of myopia on the father's side. The patient had been married three years earlier; and the author suggests that the greater attention to work required by the new social duties, the absence of which in youth had perhaps induced a less strenuous course, may have been the cause of the sudden development of the hereditary scleral weakness in his twenties which coincided with the man's own time for the loss of distance vision.

W. B. INGLIS POLLOCK.

III.—AFFECTIONS OF SIGHT FOLLOWING HÆMORRHAGE

(1) **Ellett, (Memphis, Tennessee).—A case of retinitis proliferans with pigmentation following hæmorrhage from the bowel.** *Ophthalmic Record*, January, 1910.

(2) **Moore, R. Foster.—Complete blindness following loss of blood.** *Trans. Ophthal. Society U.K.*, Vol. XXXI, Fasc. i, 1911, p. 39.

(3) **Moore, R. Foster.—Two cases of severe loss of sight following loss of blood.** *Ibidem*, p. 40.

(1) A man, aged 37 years, addicted to alcohol and suffering from stone in the kidney, had an attack of hæmorrhage from the bowel, losing about a teacupful of blood. A few days later the sight in his left eye failed him. When

*A corneal curvature of 7.8 mm. confirmed the diagnosis of axial myopia.

examined R.V. =20/20 and J. i. L.V. 20/60 and J. 8. No fundus lesion. A month later, retinal hæmorrhages and exudation were noted around the disc and along the temporal vessels. The exudation was non-pigmented and lay superficial to the vessels. Nine months later, L.V. = perception of moving objects. The left disc was now of very pale pink colour, with blurred edges and a small pigmented crescent down and in. All the retinal vessels were narrowed and without reflex. The arteries were very narrow, generally only visible near the disc, and some of them were represented by white lines. The appearance of the disc was that of postneuritic atrophy. The most conspicuous fundus lesion was a ring, one to three disc-diameters wide, and about the same distance from the disc, made up of a white lace-like formation, interspersed with a varying amount of delicate slate and black pigment, which was more abundant on the outer side. This figure was superficial to the retinal vessels, and the space enclosed by the ring, as well as that beyond it, were free from pigment. The explanation of this development, as given by the writer, is that the general hæmorrhage or hæmorrhages was followed after some weeks by œdema, and then by hæmorrhages of the retina. As a result of this hæmorrhage, a degeneration of the retinal ganglion cells followed, and this led in time to atrophy of the retina and the optic nerve, with liberation of the retinal pigment. The irritation of the retinal hæmorrhages produced a proliferation of the retinal connective tissue elements. The patient died six years later from chronic interstitial nephritis. J. JAMESON EVANS.

(2 and 3) Briefly, the three cases reported by **Moore**, of London, are as follows:—

1. Female, aged 53 years, hæmatemesis followed fifteen hours later by loss of sight in the left eye, and three days later, in other eye also. When examined a week after the hæmorrhage, pupils semi-dilated and motionless to light. Both optic discs oedematous and pallid. Two small ecchymoses on edge of right papilla. Three months afterwards, optic discs atrophic, and arteries narrowed in both fundi. No perception of light, except as regards a very small area on the temporal side of the field of the right eye.

2. In a woman of 34 years, a miscarriage was followed by much hæmorrhage, and ten days afterwards by inability to see a lighted match held before her eyes. For a fortnight, she was unable to tell light from dark, and then improvement set in. R.V. =hand movements. L.V. = 6/18. Right pupil reacted but slightly to direct stimulus by light. Optic discs, which were somewhat swollen, had fluffy edges, were pale, and surrounded by faint lines. Visual fields small. When examined some five months after foregoing note was made, there was no change in the state of the sight.

3. A male patient, aged 41 years, had been subject for ten years to "the bleeding piles." His sight had been failing for a month, but the failure was not preceded by any specially large loss of blood from the rectum. R.V. = fingers at one foot. L.V. = 3/60. Right visual field showed a complete central scotoma. and the left one a relative central scotoma. Pupils active both to light and to convergence. Optic discs pale, but retinal vessels of normal size. After the piles had been tied, there was a great improvement in the patient's general condition, but his sight remained without alteration. Altogether, this case is somewhat inconclusive, particularly as to the loss of sight being due to hæmorrhage. SYDNEY STEPHENSON.

IV.—FUCHS' MACULAR SPOT IN MYOPIA.

Pick, L.—On Fuch's macular disease in myopia. (Ueber die Fuchsche Maculaerkrankung bei Myopie.) *Zeitschrift für Augenheilkunde*, January, 1911.

The central black spot in myopia was first described by Foerster (*Ophthalm. Beitr.*, 1862, S. 55), and de Wecker has also noticed this disease (Graefe-Saemisch *Handbuch*, 1 Aufl., Bd. IV, Heft 2, S. 601.) Fuchs (*Zeitschr. f. Augenheilk.*, 1901, Bd. V, S. 171) gave the classic account of this condition, utilising the experience gained by a careful study of 40 cases, some

of which were followed for a long period of time. The black spot can be distinguished from all the more common changes seen at the macula. It commences with sudden metamorphopsia and a positive scotoma. A central scotoma can always be detected, at first relative and small, but later it becomes absolute and all reading is impossible. In early cases one sees the characteristic black spot, which is circular, sharply contoured, somewhat small, and which in its centre has a delicate reddish-grey or whitish hue. A reddish areola often surrounds the spot even at this early stage. Further development consists in enlargement up to the size of the papilla, in loss of the black colour, and in the formation of an atrophic peripheral zone. The clearing-up starts from the centre, and differs from the ordinary changes in a patch of choroiditis in that the choroidal stroma with its vessels never becomes visible. Vision never becomes normal, a central absolute scotoma remains permanently. The disease is commonly associated with other fundus changes, especially with staphyloma posticum. Hæmorrhages, according to Fuchs, are not constantly present, nor do they cause the disease. The histology of the process has been studied by Lehmus (*Zeitschr. f. Augenheilk.*, 1901, Bd. V, S. 171). At the site of the spot a well developed over-growth of the pigment epithelium was found; on this lay a gelatinous exudate attached to the retina. The cause of the whole process is unknown. It is certainly a concomitant of the stretching which characterises myopia.

The above is Fuchs' description of the disease. Since he wrote, many cases have been described. Ulrich has observed 43, and **Pick**, of Königsberg, has seen 32 more. Pick agrees with Fuchs that we are dealing with a process *sui generis*. The seat of the spot is at first not in the fovea but just above it. The patch often grows round the macula in a semicircle. Such cases have good vision with a central paracentral scotoma. Retinal hæmorrhages were frequently present, more so than in Fuchs' cases, but Pick agrees that the condition is not caused by these hæmorrhages. In the later stages of the disease hæmorrhages are rare. They are a sign that the process is still active. The anomaly is found only after early youth. The youngest patient was fifteen. In 32 cases the spot was bilateral. Pick and Ulrich believe that the prognosis is not so bad as Fuchs thought. The chances are better when the myopia is of low grade, and the patient young. Dazzling light and close work should be avoided. Energetic friction with mercurial ointment is useful. Ulrich has seen the condition get much worse after a course of sweating.

The appearance of the black spot renders dangerous complications of myopia less likely to occur: detached retina has not been noted once in Pick and Ulrich's cases.

T. HARRISON BUTLER.

V.—OPHTHALMIA NEONATORUM.

(1) **Post, M. H.—Prevention of blindness from ophthalmia neonatorum.** *American Journal of Ophthalmology*, September, 1910.

(2) **Willim, R. M.—On blennorrhœa neonatorum. (Die Augeneiterung der Neugeborenen.)** *Klin. Monatsbl. f. Augenheilkunde*, Oktober, 1910.

(1) **Post's** (St. Louis) paper, read at the National Conference of Charities and Corrections, St. Louis, May 19th to 26th, 1910, is of the popular educative type, and does not appear to contain any new matter.

ERNEST THOMSON.

(2) **Willim** has inquired at a great number of important lying-in-hospitals as to the drugs used for the prevention of blennorrhœa neonatorum. He found that 1 per cent. silver nitrate was applied in 50,550 cases, 1½ per cent. silver nitrate in 1,513 cases, ⅔ per cent. silver nitrate in 6,266 cases, ½ per cent. silver nitrate in 1,264 cases, solution of acetate of silver in 10,000 cases, protargol (2.5 per cent. to 20 per cent.) in 10,000 cases, 5 per cent sophol in 10,000 cases. Compared with 2 per cent. silver nitrate, which was used in over 20,000 cases, the weaker solutions of this drug appear to be just as trustworthy, while causing much less irritation. To what exact degree, however, the concentration of silver nitrate solutions may be reduced with safety, is not quite settled yet. Of the organic silver preparations, the 5 per cent. solution of sophol (silver bound chemically to form aldehyd-nucleinic acid) may be found in the future to out-distance all competitors. So far it has given excellent results, combining efficacy with nearly complete absence of irritation. C. MARKUS.

VI.—FIBROUS DEGENERATION OF THE RETINA.

Schneider, W.—On a case of gliosis of the retina (Ueber einen Fall von Gliose der Netzhaut.) *Zeitschrift für Augenheilkunde*, Oktober, 1910.

Gliosis of the retina is described by Parsons (*Pathology of the Eye*, Vol. II, page 576) and is in England generally termed "fibrous degeneration of the retina." There is, Parsons states, no evidence that the new-formed tissue is really neuroglial in origin. On the other hand, there is abundance of evidence that the hyperplasia is mesoblastic in nature, and is therefore derived from the vessels and from the choroid. There is no evidence that the cells of the vitreous can proliferate and give rise to fibrous tissue.

The eye examined by **Schneider**, of Marburg, was excised because it was thought to contain a tumour of the choroid. After an accident, cataract developed. The lens was removed successfully and a clear pupil obtained. But vision never rose above perception of hand-movements. The retina was found to be completely detached, and examination with Sachs' lamp demonstrated a black mass in the vitreous. The eye was excised, and the tumour found not to be a new growth, but a gliosis. Two coloured drawings show the appearance of two sections very clearly. T. HARRISON BUTLER.

VII.—GLIOMA.

(1) **Casali, A.—Three cases of glioma of the retina. (Sopra tre casi di Glioma retinico.)** *Annali di Ottalmologia*, Vol. XXXIX, Fasc. 5-6, p. 413.

(2) **Foucher (Montreal).—Intradural glioma of the optic nerve, with macroscopical and microscopical findings.** *Ophthalmic Record*, January, 1910.

(3) **Stieren.—A report of three cases of glioma retinæ.** *Ophthalmic Record*, March, 1910.

(4) **Bergmeister, R.—A contribution to the glioma question.** (Ein Beitrage zur Gliomafrage.) *Zeitschrift für Augenheilkunde*, Oktober, 1910.

(5) **Curtil, A.—Regarding two cases of metastatic ophthalmia simulating glioma of the retina.** (A propos de deux cas d'ophtalmie métastatique simulant un gliome de la retine.) *Revue Générale d'Ophtalmologie*, 31 décembre, 1910.

(6) **Ayres, S. C.—Glioma of the retina. Report of one case of unilateral and one case of bilateral glioma.** *American Journal of Ophthalmology*, April, 1911.

(7) **Stoll, K. L.—Double glioma of retina.** *Ibid.*

(1) The three cases of retinal glioma studied by **Casali** merit the name of "Glioperitheliomata," as indeed, according to the author, do most of the gliomatous neoplasms of the retina. The qualification of perithelioma is more appropriate than that of angio-sarcoma adopted by Waldeyer and others, since the characteristic of the tumours in question is to be found not in the ordinary conjunctival elements but in the endothelial elements of hybrid nature, as pointed out by Borst, particularly the elements which constitute the perithelium of the vessels. A. ANTONELLI.

(2) **Foucher's** patient was a boy, aged 2 years and 3 months. When seen, the right eyeball was prominent and painful, the pupil dilated, and through the transparent media a choked disc with retinal hæmorrhages could be seen. The eye was completely immobile, the tension was very high, and vision seemed abolished. Two weeks later, the eye became more painful and glaucomatous, and the disc showed signs of atrophy. Proptosis of the eye had been noticed by the mother three months before the ophthalmic examination was made.

A diagnosis of tumour of the optic nerve was made, and the growth was dissected away from the orbital contents after enucleation of the eyeball. There was no sign of recurrence six months later, apart from lesions due to injury at the time of the operation. Microscopical examination of the eye showed obliteration of the filtration angle, and round cell infiltration of the iris, retina, vitreous, and sclera, and some degenerative changes in the retina and the peripheral portions of the lens.

The posterior half of the retina was detached by a slightly fibrinous exudate containing a number of lymphocytes. The optic nerve was about twice the normal diameter, and there was parenchymatous degeneration of the nerve elements ; many of the septa had disappeared, those present were greatly thickened, and no medullated nerve fibres could be found in any section. There was an enormous proliferation of the interstitial tissues, affecting chiefly the neuroglia. The presence of optic neuritis was shown by the large numbers of small round cells and fibroblasts, and chronic perineuritis was evidenced by an obliteration of the intervaginal space through enormous proliferation of the endothelium, and by infiltration with fibroblasts and round cells. The papilla was swollen, and infiltrated with cells, which were mostly of the neuroglia and fibroblast type. J. JAMESON EVANS.

(3) The first case by **Stieren**, of Pittsburg, was a double glioma in which double enucleation was refused, the growths perforated the globes, and for a week before death, which occurred in five months, the child was completely paralysed and had convulsions.

The second case simulated gross tubercle of the choroid, and the optic

nerve was thickened and felt fatty. The patient died six weeks after enucleation with all the classical symptoms of tuberculous meningitis.

In the third case the growth apparently arose from the nerve-head, but microscopic examination showed that it grew from the retina without involvement of the nerve. J. JAMESON EVANS.

(4) This illustrated paper by **Bergmeister**, of Vienna, describes certain abnormalities found in an eye exised for glioma. These fell naturally into three groups.—A persistence of earlier steps in development in one portion while others continued to develop. An antegenetic degradation to a lower grade of one portion which had once attained a higher grade of development. New growth of an atypical kind, excessive growth of definite parts at the expense of others. In other words, there is in such so-called "rudimentary eyes," inhibition forms, degeneration, and progressive but atypical growth, all to be distinguished from each other.

The deformities were, ciliary processes growing centripetally to the normal ciliary body springing from the iris root; persistence and growth of foetal vessels in the vitreous; and embryonic tissues persisting in the retina.

T. HARRISON BUTLER.

(5) **Curtil,** of Lyon, relates two cases of metastatic ophthalmia simulating glioma of the retina from the *clinique* of Prof. Rollet, gives a brief *résumé* of the history of our knowledge on this subject, and enumerates the various conditions which may be included under the title "pseudo-glioma." These are: metastatic ophthalmia, especially in the form of exudative choroiditis; metastatic or traumatic, exudative or suppurative lesions of the vitreous; choroidal tuberculosis; simple detachment of the retina; certain congenital anomalies; cysticercus of the deep membranes of the eye. The author does not think that syphilis has given rise to diagnostic mistakes. With regard to the question of what to do in difficult cases of doubtful glioma, he does not seem to be able to help us in any very definite way.

ERNEST THOMSON.

The cases reported by (6) **Ayres,** of Cincinnati, and (7) **Stoll,** of Cincinnati, do not seem to present anything very new from the clinical standpoint, and the histological details may be read in the original.

Ayres quotes the statistics of Owen which show that the proportion of bilateral to unilateral glioma is a fraction less than 25 per cent.

These cases all indicate the extreme danger of delay in this disease.

ERNEST THOMSON.

VIII.—SHALL WE ENUCLEATE THE EYEBALL IN PANOPHTHALMITIS?

Kontorowitsch, Ida.—Should enucleation be performed in commencing or advanced panophthalmitis? (Darf bei beginnender oder vorgeschrittener Panophthalmie die Enukleation gemacht werden?) *Beitr. z. Augenheilk.*, Januar, 1911.

Since the Ophthalmological Congress of 1863, when A. v. Graefe reported two fatalities after panophthalmitis, the question has been much discussed as to whether a purulent globe may safely be enucleated.

Statistics with regard to fatality after enucleation of panophthalmitic eyes are somewhat at variance, probably on account of an inconstant definition of

panophthalmitis. C. Devereux Marshall records that over 6,580 enucleations were performed in the Royal London Ophthalmic Hospital between the years 1861 and 1896. It is not stated how many of these were done for panophthalmitis, but there were eight cases of enucleation followed by meningitis. In five of these panopthalmitis was the indication, and in three, chronic inflammation. In connection with the above, it may be mentioned that, from the literature, it appears that purulent meningitis follows enucleation of eyes with chronic inflammatory processes more often than with acute symptoms.

Kontorowitsch now publishes a series of 118 cases of enucleation performed in Zürich by Haab and Sidler-Huguenin. One of these terminated fatally, that of an emaciated old man, who would not consent to having the operation until a week after the onset of the panophthalmitis. The *post-mortem* examination showed no suppurative lesions, but only the signs of senile heart failure. In such a case, the gravity of the constitutional symptoms make it imperative that the operation should be undertaken at once, in spite of the attendant excitement and local anæsthesia. In another case, that of a quiet-looking staphylomatous eye, soon after the operation, the wound surfaces were found to be in a condition of suppuration. The orbit was well washed out with mercuric chloride solution (1 in 1,000) and packed with gauze surrounding a rubber drain. The recovery was uneventful. This case illustrates the fact that the appearance of an eye is no guarantee as to its sterility, and that living micro-organisms have been found even in shrunken eyes. In yet another case, chemosis and infiltration of Tenon's capsule were noted, which occurred three days after the operation. This passed off in three days, and was probably due to toxins and not to the presence of micro-organisms, as none were found in the wound.

In the literature, in general, it is stated that, in the cases of meningitis following enucleation, the optic nerves, and even the orbits, are quite normal after the operation. This has led some authors to the assumption that meningitis following enucleation was not to be ascribed to the operation, but to metastasis occurring before the eye was enucleated. Enslin and Kuwahara, however, record a case where the orbit appeared normal, but where it was proved microscopically and bacteriologically that there was a streptococcic suppurative process extending along the sheaths of the orbital and intracranial portions of the optic nerve to the surface of the brain. Further, there was a similar process extending along the divisions of the orbital fascia and into the muscles. The optic nerve stump on the enucleated eye, moreover, was quite normal microscopically. This makes it clear that the extension along the nerve-sheaths can have occurred only after the operation. In the case in point the infection resulted from rupture of the globe during operation, whereby the infective contents of the eye came in contact with the wound surfaces. From this it appears advisable that one should avoid as much as possible infection of the wound at the time of the operation, and, if such occur, that one should thoroughly disinfect the orbit, for the opening of the intervaginal space of the nerve sheath would seem to be the greatest factor in meningitis. The cases of meningitis in relation to panophthalmitis without a preceding enucleation, as Marshall has mentioned twice, and Warlomont and Webster once each, are very rare. Such cases do occur, however, as also after evisceration, as Bocci, Becker, Alfieri, and Ball have recorded. The conservative treatment of panophthalmitis, and evisceration, therefore, cannot be regarded as safeguards against meningitis.

In addition to the nerve-sheath route, already mentioned, there would seem to be other paths of infection of the meninges. Leber describes a case where

the sixth nerve sheaths transmitted the infection. Further, the third and fourth sheaths, as well as the ophthalmic vein and cavernous sinus, may perform this function, as shown by Katzenstein's case, where Orth found *post-mortem* disintegrated thrombi in the cavernous sinus on either side of the sella Turcica, connected with a small extension of extra-meningeal suppuration. Around the sixth nerve, also, there was extension of the process from the cavernous sinus into the orbit. The orbital periosteum appears to play no part in the path of infection except in the case of severe wounds with fissures or fractures, or after periostitis or caries of the orbit. In the advanced stage of a panophthalmitis of much severity, with chemosis and proptosis, it is generally stated that the micro-organisms responsible for the septic process have passed the barriers of the ocular tunics and the conjunctiva, and have invaded the capsule of Tenon. This is probably wrong, for the chemosis and proptosis may quite readily be explained as the reaction of the tissues, not to micro-organisms, but to the metabolites of the septic process which have diffused outwards through the coats of the globe; further, if such were the case, one would expect to find meningitis a very common sequela of panophthalmitis, whereas the occurrence of meningitis in the 118 enucleations described is conspicuous by its absence, although a number of these operations were performed as long as twenty days after the onset of severe panophthalmitis. Hence, those who recommend evisceration in advanced cases of severe panophthalmitis, on the ground that the septic process has already extended through the coats of the eyeball and that no advantage is to be gained by enucleation, are wrong. In addition, if evisceration is not done very carefully, one is liable to open up the lymph channels at the optic nerve entrance, which communicate with the inter-vaginal space. This is what occurred in the case recorded by Bocci. Moreover, Minrath has pointed out that recovery after an evisceration takes twice as long as recovery after an enucleation.

Kontorowitsch recommends enucleation in all cases, and gives the following advice:

1. If the eye is severely wounded, and certainly lost, and where the healing of the wound would take long, enucleation must be done as early as possible, as, if one waited, suppuration would probably take place in the eye, which would render infection more likely during the operation.

2. If the eye is less seriously wounded, one might wait until the wound were healed, in order that the eye might be removed *in toto* without bursting. If such occur, one should wash out the orbit very thoroughly with a disinfectant.

3. In accordance with the fact that micro-organisms have been found even in shrunken globes, after every enucleation the lids should be separated with Desmarre's retractors, and the orbit well washed out with 1 in 1,000 corrosive sublimate solution. The wound should be packed with iodoform gauze strips, and be fitted with a rubber tube draining into dry sterile wool under the bandage.

ERIC A. THOMSON
(Jerusalem).

IX.—THE MODERN DIAGNOSIS OF SYPHILIS AND TUBERCLE.

Igersheimer, J.—How far is the modern diagnosis of syphilis and tuberculosis in a position to modify accepted views regarding the ætiology of certain diseases of the eye? (Inwiefern ist de moderne Syphilis und Tuberkulosediagnostik instande die bisherigen Anschauungen über die Atiologie gewisser Augenerkrankungen zu modifizieren?) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg*, 1910.

Igersheimer (Halle).—The methods of diagnosing syphilis and tuberculosis have improved so greatly during recent years that it is advantageous to review the effect of our increased knowledge upon the accepted views of the ætiology of certain eye diseases.

Wassermann's reaction is an important advance. A negative reaction does not exclude past syphilis. If therefore the reaction is negative and the eye disease of recent date a syphilitic ætiology is improbable. The demonstration of spirochaetæ may definitely decide a doubtful ætiology, as in a case of tarsititis which the author reports. In cases of anterior choroiditis the Wassermann reaction is not infrequently negative, although congenital syphilis is certainly present. The amount of pigment shows that the process is of old standing and so a negative result would be expected. Interstitial keratitis is, in Igersheimer's opinion, almost invariably of syphilitic origin. On the other hand, in cases of iritis and choroido-retinitis syphilitic inhibiting bodies are much rarer; these diseases are very frequently tuberculous in origin. In childhood, however, diseases of the uvea are more commonly syphilitic. In adults at least 85 per cent. of uveal inflammations are not syphilitic; in children at least 60 per cent. are syphilitic. Careful research upon adults suffering from disease of the uvea carried out by injections of tuberculine having regard both to the positive reactions obtained and the therapeutic action of the injections has convinced the author of the immense importance of tuberculosis in eye diseases. He found that among 34 patients with uveal disease who gave a negative Wassermann 52.9 per cent. reacted to tuberculine and were suffering from actual tuberculosis of the uvea. Practically all the cases in which the choroid participated were tuberculous in origin. Scleral inflammation is much more frequently a tuberculous disease than was once thought. In many cases in which scleritis and articular rheumatism are associated the joint disease is in reality tuberculous in nature. Tuberculosis may cause retrobulbar neuritis with central scotoma. Many cases of retinitis, especially those in which the vessels participate, are tuberculous. T. HARRISON BUTLER.

X.—HETEROCHROMIA IRIDIS.

(1) **Galezowski.—Heterochromia of the iris. (Heterochromie de l'iris.)** *Receuil d'Ophtalmologie*, juin, 1910.

(2) **Mayou, M. S.—Hetrachroma iridis, associated with paralysis of the sympathetic in early life.** *Trans. Ophthal. Society U.K.*, Vol. XXX, Fasc. 3, p. 197, 1910.

(3) **Mayou, M. S.—Hetrachroma iridis, associated with paralysis of the sympathetic in early life.** *Ibidem*, p. 196.

(1) Under the title of heterochromia of the iris **Galezowski,** of Paris, discusses the peculiar form of chronic inflammatory disease of the uvea, in which there is often a fine precipitate on the back of the cornea, depigmentation of the iris (which assumes a blue colour), vitreous opacities, and, occasionally, a slight degree of optic neuritis. This condition is quiet, slow, and painless, and is not associated with pericorneal injection or posterior synechiæ, but is frequently associated with the formation of soft cataract beginning in the posterior part of the cortex. The cataract always develops in the eye with the depigmented (blue) iris, and the other eye remains sound. The heterochromia generally appears in early adult life, and is probably always preceded by chronic inflammatory symptoms, of which, in the opinion of Galezowski, the depigmentation and the cataract are the results. The ectodermic pigment of the retina and the *pars iridæ retinæ* is not affected by this chronic uveitis, the cause of which has not been ascertained, but is probably not syphilis or tubercle. The prognosis is favourable; operative treatment of the cataract is generally successful and the corneal deposits disappear after this operation or even after puncture of the anterior chamber. J. Jameson Evans.

(2 and 3) The two patients exhibited by **Mayou,** of London, were aged $3\frac{1}{2}$ and 6 years respectively, and instruments had been used at the birth of each child. Paralysis of one sympathetic was associated in each instance with a difference in the colour of the two irises. This hetrachroma, in Mayou's opinion, is due to a failure in the development of the pigment in the stroma of the iris. Sydney Stephenson.

XI.—BIASTIGMATISM.

Marquez, Professor. — On Biastigmatism. (Sur Biastigmatisme.) *XIth International Congress of Ophthalmology,* Naples, 2nd to 7th April, 1909.

The little differences between the readings of the ophthalmometer in cases of astigmatism and the actual findings by other methods are usually due to the fact that there are causes of astigmatism other than corneal, and these are either added to, or neuturalise, the corneal astigmatism. The most common of these causes is the existence, in almost every subject, of an inverse astigmatism of 0·5 to 0·75 dioptre produced by the slightly inclined position of the lens with regard to the visual line. Although this tilting as a cause of the astigmatism has been denied by Sulzer, on the ground that the difference in the refractive index of the ocular media is too slight, it is certain in any case that when the corneal astigmatism is *direct*, this 0·50 to 0·75 D. must be subtracted from the ophthalmometric result, and, when it is *inverse*, must be added thereto. In all previous cases the meridians of maxima and minima of the two astigmatisms either coincide or are precisely at right angles, being added to, or substracted from, each other respectively.

Marquez, of Madrid, in the article which is prefaced by the foregoing remarks, states that he has no doubt that there are still other cases in which the meridians of maxima and minima of the corneal and lenticular astigmatism do not coincide. These cases of complex astigmatism he calls "*Biastigmatism.*" It must be noted that such biastigmatism has nothing whatever to do with bioblique corneal astigmatism, in which the two principal meridians of the

cornea are not perpendicular to one another. Marquez says he has seen several cases, but calls attention to one in particular which he was able to work out completely, owing to the great intelligence of the patient. In this case, which occurred in a boy of 13 years, the astigmatic left eye had V.A. 1/6 and the likewise astigmatic right eye had V.A. 1/4. By the ophthalmometer the left eye had 0·75 D. of corneal astigmatism while the right eye had 1·25 D., inverse in both.

When it came to the subjective test, however, by no amount of variation of the cylinder, with or without sphericals, could the V.A. be brought up beyond 2/3. There was nothing abnormal in the fundus.

From the boy's statements when tested with the clock face, Marquez was led to the suspicion that the astigmatism, other than corneal, might have an axis not coincident with that of the corneal astigmatism. This turned out to be the case, and it was eventually found that with the corneal astigmatism corrected by −0·75 D. at 90°, and the remaining astigmatism by 1 D. at 105° the patient had V.A.=1. The other eye was corrected in the usual way with the addition of a 0·5 D. cylinder to the 1·25 D. cylinder indicated by the ophthalmometer and at the same axis.

As regards the making of the spectacle lens, the optician united two plano-cylinders with Canada balsam at an angle of 15° to each other, *viz.*, at 90° and 105°.

These cases, then, must be kept in mind. What is to be done if a sphere has to be added to the double cylinder? The author suggests cylindro-toric lenses—that is, lenses having on one face the curvature of a cylinder and on the other of a tore, the latter being equivalent to a cylindro-spheric combination.

ERNEST THOMSON.

XII.—THE INSPECTION OF SCHOOLS AND SCHOOL CHILDREN.

(1) van den Bergh.—School inspection at Anderlecht. (L'inspection oculistique des écoles à Anderlecht.) *Société Belge d'Ophtalmologie*, 25 avril, 1909.

(2) Snegireff, K. W.—On the ophthalmic conditions of deaf-mute school children. (Ueber den Zustand der Augen taubstummer Schulkinder.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1909.

(3) Katz, R.—On the organisation of the ophthalmic service in schools. (Sur l'organisation du secours oculistique dans les établissements d'enseignement.) *Rev. d'Hygiène et de Thér. Oculaires*, juin, 1910.

(4) Dubar, Léon.—The examination of the pupils of a professional school from the ocular point of view. (Examen des élèves d'une école professionnelle au point de vue oculaire.) *Rev. d'Hygiène et de Thér. Oculaires*, août, 1910.

(5) Leprince, A.—School myopia; treatment; hygiene and prophylaxis. (Myopie scolaire; traitement; hygiène et prophylaxie.) *Rev. Int d'Hygiène et de Thér. Oculaires*, septembre, 1910.

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(8) Thibert.—Inspection of the Liége schools. (L'inspection oculistique des écoles à Liége.) *Ibidem*, p. 203.

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(10) Kaz, R.—Hygiene and ocular therapeutics, their place in actual ophthalmology. (L'Hygiène et la thérapeutique oculaires, leur place dans l'ophtalmologie actuelle.) *Rev. Int. d'Hygiène et de Thér. Oculaires*, janvier, 1911.

(11) Burgerstein, L.—Conseils d'hygiène aux écoliers. *Rev. Int. d'Hygiène et de Thér. Oculaires*, mars, 1911.

(12) Story, J. B.—Medical inspection of schools and school children. *Dublin Journal of Medical Science*, April 1st, 1911.

(13) Heilborn.—Our means of action against school myopia. (Nos moyens d'action contre la myopie scolaire.) *Rev. Int. d'Hygiène et de Thér. Oculaires*, avril, 1911.

(1) In order to facilitate the rapid and easy determination of the visual acuity from the beginning of school life—that is to say, towards the sixth year—**van den Bergh**, of Brussels, has devised pedagogic optotypes. These take the form of squares, one side of which is absent. Two types (*tableaux*) are intended to develop the sense of orientation in children of three or four years; a third type constitutes a reading exercise for children of from four to five years; lastly, the fourth type serves to determine the visual acuity. Teachers may in this way measure the sight of their pupils with the greatest facility, and place the children conveniently. The town of Anderlecht has instituted a school laboratory for examining the sight of all found to be abnormal, and for investigating thoroughly those of an interesting or unusual nature. H. COPPEZ.

(2) **Snegireff** examined the eyes of 100 deaf-mute school children between 9 and 19 years of age. As to refraction, 28 had emmetropia, 63 hypermetropia, and 9 myopia. This comparative rarity of myopia has also been the experience of other investigators. Vision was less than 0·5 in 10 per cent. only of the eyes examined, and thus not worse than that of normal school children. Two children had pigmentary degeneration of the retina, two optic atrophy, two choroiditis, three congenital amblyopia, one cataract, one divergent squint, nine affections of the cornea (nebulæ) and eighteen such of the lids and conjunctiva. The two children with retinitis pigmentosa were brother and sister, but the parents were non-consanguineous. This affection of the retina occurs, according to the published statistics, in about 3 per cent. of deaf-mutes. C. MARKUS.

(3) **Katz**, of Saint Petersburg, discusses the following questions.—1. Should a school usually provide ocular assistance for its scholars? 2. Should the sight of each scholar be examined separately by the ophthalmic surgeon? and 3. Should the school oculists examine the eyes of the pupils in the schools themselves, or should that be done in school dispensaries? His conclusions are as under.—1. Whenever possible, school oculists should be employed. 2. The best results can be obtained only by the collaboration of the oculist, the general doctor, and the teaching body.

3. The sphere of activity of each of these parties should be clearly indicated in a code of rules for distribution to the schools. SYDNEY STEPHENSON.

(4) **Dubar**, of Armentières, gives an account of the examination of the eyes of the scholars in an institution where manual training formed an important part of the curriculum. Of 340 lads (12 to 18 years of age), 124, or 19 per cent., had defective sight, that number being made up of hyperopia 12 per cent., astigmia 0·5 per cent., and myopia 2 per cent. (*sic*). The author thinks that there may be a connection between myopia, on the one hand, and tuberculosis, on the other. SYDNEY STEPHENSON.

(5) **Leprince**, of Bourges, reaches the following conclusions.—The prevention and hygiene of school myopia should admit of: 1. An examination of the eyes of every child on his admission to a primary or secondary school. The examination may be reduced to the determination of the visual acuity in the primary schools, but in the others, such as normal schools, and *lycées* or colleges for boys and for young girls, anomalies of refraction should be determined. 2. The complete correction of visual anomalies, especially of myopia and astigmatism. 3. Observation of the abnormal children during the course of their studies, particularly in the secondary schools. 4. Inspection of the lighting and school furniture. 5. The prevention of bad attitudes during reading and writing. 6. Annual conferences of the school teachers of the normal schools bearing upon visual acuity and anomalies of sight.

SYDNEY STEPHENSON.

(6) **Heilborn**, of Breslau, thinks it probable that blood-pressure plays the preponderating part in the production of myopia. He pleads for a statistical distinction between very high myopia, on the one hand, and varieties, on the other. The most logical classification, he thinks, is into professional myopia (*a*) without congenital predisposition, and (*b*) with congenital and hereditary predisposition, and (*c*) and pernicious myopia. He advocates the obligatory inspection of all eyes in children between the ages of 6 and 20 years, together with the exact correction, if need be, of the myopia. A knowledge of the dangers of myopia, also, should be disseminated amongst the general public. The school is not alone to blame for the development of myopia, of which Heilborn recognises three types, namely, the *pré-scolaire*, the *scolaire*, and the *post-scolaire*. For patients suffering from pernicious myopia, the author advocates the creation of special schools, the teaching of stenography, and attendance at the Berlitz schools. The choice of a profession for these patients should be the duty of the oculist. The final recommendation is to prohibit the provision of concave glasses unless obtained from an optician on the prescription of a surgeon-oculist.

SYDNEY STEPHENSON.

(10) This article by **Kaz**, or Saint Petersburg, is written around the truism that "the prevention of disease is the first duty of the physician." He endeavours, in particular, to arouse the ophthalmic surgeon to a sense of his duty in this respect. Neither in the text-books nor in the ophthalmic periodicals is much attention paid to the subject. Kaz concludes a somewhat querulous article with the words:—"treat rather than operate, cure rather than treat, and prevent rather than cure." SYDNEY STEPHENSON.

(11) **Burgerstein**, of Vienna, has formulated a comprehensive set of rules intended to be placed in the hands of scholars. They deal with the care both of sight and of hearing. To the English reader it sounds somewhat strange to be told to plug the ears with cotton-wool when taking a cold bath.

SYDNEY STEPHENSON.

(12) According to **Story**, of Dublin, in Ireland schools "receive less attention than cowsheds." In order to stimulate his countrymen to action,

he relates what has been done in England and Wales under the recent Education Acts, whereby the State assumes responsibility for the children whom it has compelled to attend elementary schools. The Education (Administrative Provisions) Act of 1907 came into force on January 1st in the following year, yet owing to what the author does not hesitate to term "the shameful neglect" of the Irish Parliamentary representatives of all shades of opinion, its provisions do not apply to Ireland. Story outlines the system whereby the school-nurse, the teacher, and the parent act in co-ordination with the medical authority or school medical officer. He appends a copy of the so-called "Schedule of Medical Inspection" issued under the authority of the Board of Education. In brief, he gives a very lucid account of the machinery now at work in England and Wales as regards the inspection of elementary school children. Figures are quoted and analysed from the 328 educational areas of the two countries. He estimates that three-tenths of a penny rate in the pound sterling is enough to defray the cost of medical inspection as carried out in those countries. Story ends an exceptionally well-written article with the expression of his bitter regret that what has already been accomplished in England and Wales cannot also be done in Ireland. He scouts the notion of his country not being in a position to afford the small charges upon the community necessary to provide efficient medical inspection of schools and school children.

SYDNEY STEPHENSON.

(13) In order to combat "school myopia," **Heilborn,** of Breslau, advises the appointment of eye specialists to act in conjunction with the school doctors.

SYDNEY STEPHENSON.

XIII.—SYMPATHETIC OPHTHALMIA.

(1) **Santucci, S.—Sympathetic ophthalmia in connection with the cyto-toxic theory.** (L'oftalmia simpatico in relazione alla teoria delle cito-tossine.) *Annali di Ottalmologia*, Vol. XXXVI, Fasc. 3-4.

(2) **Roy, Dunbar.—Some observations upon sympathetic ophthalmitis.** *Ophthalmology*, January, 1910.

(3) **Ormond, Arthur.—Sympathetic ophthalmia.** *Clinical Journal*, May 11th, 1910.

(4) **Asmus and Mellinghoff.—Clinical and anatomical observations upon a case of grave sympathetic ophthalmia.** (Klinische und anatomische Beobachtung eines deletären Falles von sympathische Ophthalmie.) *Zeitschr. f. Augenheilkunde*, 26 Oktober, 1910.

(6) **Jones, Cecil Price, and Browning, S. H.—Note on the blood in sympathetic ophthalmia.** *Brit. Med. Journal*, June 17th, 1911.

(1) After a good *résumé*, accompanied by a bibliography, **Santucci,** of Rome, brings an original case to the study of sympathetic ophthalmia. He applies the cyto-toxic theory to the ætiology of that affection—that is to say, of sera possessing a toxic elective action upon this or that organ of the body. Just as there exist cyto-toxins or autocyto-toxins of the kidneys, ovaries, etc. so there may be ocular cyto-toxins; and Santucci tries to demonstate the fact by inoculations under the skin or the conjunctiva of rabbits of emulsions of

tissues of the healthy eye or of emulsions of the tissues of a gravely injured eye in the animal (almost phthisical). These researches, although very long and laborious, are still, according to the author, insufficient in number, who now makes a preliminary communication in order to establish the theory definitely. At the same time their results appear to be sufficiently encouraging to lead to other studies along the same lines, destined to affirm the ætiology of sympathetic ophthalmia by the agency of auto-cyto-toxins.

A. ANTONELLI.

(2) In this paper **Roy** restates the old problems which confront the ophthalmic surgeon in almost every case of eye injury, namely, should we enucleate, or attempt to save, an injured eye for the sake of the vision which it still retains? and, if sympathetic irritation or inflammation has occurred, will any good result from enucleation of the injured eye? The three or four cases described in his article do not throw much light on these questions.

The second part of the paper consists of a pathological report, by Dr. E. L. Oatman, on two eyes, one of which was removed on account of sympathetic irritation, the other for sympathetic inflammation of the fellow eye. Briefly, he found in the eye which excited irritation only, an acute iridocyclitis characterised by the presence of large numbers of polymorphonuclear leucocytes, but without endothelial cells in the exudate, while in the eye which excited sympathetic inflammation the exudate was free from polymorphs, and presented an abundance of lymphocytes and endothelial cells. His results, therefore, corroborate the theory advanced by Fuchs with regard to the histological changes in the exciting eye. The paper is illustrated by several drawings.

A. J. BALLANTYNE.

(3) This is a reprint of a clinical lecture on sympathetic ophthalmia delivered at Guy's Hospital by **Ormond**, of London. The lecture centres around a case where good vision was obtained by operation in the "exciting" eye, the other, the "sympathising" eye, being practically lost. He questions the dangerous nature of wounds of the so-called "dangerous area" of the eye. They are not of necessity followed by sympathetic ophthalmitis, whereas perforating wounds elsewhere may be.. According to modern views, we must regard sympathetic disease as a specific disease of the uveal tract, the result of an endogenous infection by ultra-visible micro-organisms. Ormond has often noticed evidences of constitutional disturbance in cases of sympathetic trouble, such as pallor, malaise, anorexia, constipation, etc. Some aqueous removed from the patient described by Ormond proved to be sterile, as did also a specimen of the blood after incubation for three days at a temperature of 37°C. At the same time there were definite blood changes, in the shape of a very marked increase in the percentage of large mononuclear lymphocytes, suggesting the presence of protozoa. In the treatment of the disease, Ormond expresses his preference for mercury as compared with salicylic acid, quinine, and so forth.

SYDNEY STEPHENSON.

(4) This sad case, by **Asmus** and **Mellinghoff**, of Dusseldorf, amply corroborates the golden rule that every blind eye which has sustained a perforating wound should be sacrificed in the interest of its fellow.

On September 26th, 1900, a sixteen-year old boy ruptured his cornea with a piece of wood he was trying to break. The wound healed with an iris encleisis up and in. On October 25th, 1910, discission of the lens was performed. On October 30th, an attempt was made with capsule forceps and spoon to evacuate the lens masses. The posterior synechiæ rendered this very difficult. On January 5th, 1901, iridectomy was performed with little visual improvement. At the end of 1901, glaucoma supervened. The parents refused to allow de Wecker's iridectomy to be attempted. The

tension fell under the action of salicyl, and later of eserine. All this time the eye was almost free from injection, but the tension remained raised and the eye was blind. *Enucleation was not advised.* This part of the case is described by Asmus.

On December 23rd, 1904, the boy was seen by Mellinghoff who found sympathetic ophthalmia already well developed. The exciting eye was at once excised, and mercury pushed by inunction. In spite of all that was done, the eye became practically blind. Two and a half years later an iridectomy caused a severe reaction and the coloboma filled up with exudate.

An examination of the exciting eye showed that although $4\frac{3}{4}$ years had elapsed since the accident, there was active inflammation in the choroid. The type of inflammation was that described by Fuchs as essentially pathognomonic of sympathatic infection. Salicylates, which have been shown by Widmark to be almost specific in transferred ophthalmitis, were apparently not used by Mellinghoff. The retention of a blind eye after an accident which had left anterior and posterior synechiæ would appear to have been a grave error of judgment. The whole case is a warning. As Mellinghoff says, he would rather enucleate hetacombs of blind and semi-blind eyes after perforative traumata than lose a single sound eye from sympathetic ophthalmia.

T. HARRISON BUTLER.

(5) **Jones** and **Browning**, of London, have examined the blood from nine cases of sympathetic ophthalmia, and in all the specimens have found an increase in the relative percentage of the large mononuclear cells, together with a diminished relative percentage of polymorphonuclear leucocytes, changes which appear to suggest that the disease in question is due not to a bacterial but to a protozoal infection. Syphilis was excluded in six of the cases by a negative Wassermann reaction. The blood-counts before and after the administration of "Salvarsan" in two cases are set forth in tabular form.

SYDNEY STEPHENSON.

XIV.—REMEDIES.

(1) **Schiele, A.—On the influence of subconjunctival injections of solutions of sodium iodate, potassium iodate, and other salts in the absorption of cataract.** (Ueber den Einfluss der subconjunctivalen injektionen von Sol. Natrii jodici und Sol. Kalii jodati und anderer Medikamente auf die Aufheilung der Katarakt.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 28 April, 5 Mai, 1910.

(2) **Oppenheimer, E. H.—Atropine in iritis.** (Atropine bei Iritis.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 2 Juni, 1910.

(3) **Scarlet red in ophthalmic practice.** *American Journal of Clinical Medicine*, 1910.

(4) **Stuelp, O.—The results to date of the Ehrlich-Hata syphilitic means of treatment "606," with special reference to ophthalmology. I. Report to the middle of August, 1910.** *Wochenschrift f. Therapie u. Hygiene d. Auges.*, September 1 and 8, 1910.

(5) **Cohn, Paul.—Ehrlich-Hata "606" and the eye.** (Ehrlich-Hata "606" und Auge.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, Oktober 6, 1910.

(6) Nacht, Albert. - Ehrlich-Hata "606" in syphilitic diseases of the eye. (Ehrlich-Hata "606" bei syphilitischen Augenerkrankungen.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 1 Dezember, 1910.

(7) Horsley, Sir Victor.—An address on surgical versus the expectant treatment of intracranial tumour. *British Medical Journal*, December 10, 1910.

(8) Erlanger, M.—Addition to the chapter "atropine poisoning in children with diseases of the eye." (Beitrag zum Kapitel "Atropinvergiftung bei augenkranken Kindern.") *Wochenschrift f. Therapie u. Hygiene d. Auges*, 16 Februar, 1911.

(9) Oppenheimer, E. H.—Atropine in children. (Atropin bei Kindern.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 6 April, 1911.

(10) Kaz, R. —A few words on the treatment of parenchymatous keratitis. *La Clinique Ophtalmologique*, 10 avril, 1911.

(11) Heckel, Edward H.—The extractum corporis ciliaris in the treatment of sympathetic ophthalmia, with a report of two cases. *Ophthalmology*, April, 1911.

(12) O'Connor, R. P.—Report of case of infection following cataract extraction, treated by vaccines with rapid recovery. *Ophthalmology*, April, 1911.

(13) Kaz, R.—On the strength of the atropine solution in inflammation of the iris. (Ueber die Stärke der Atropinlösung bei Entzündungen der Regenbogenhaut.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 20 April, 1911.

(14) Cohn, Paul. — Ferro-saiodine in ophthalmology. *Medizinische Klinik*, No. 42, 1910, and *La Clinique* (Bruxelles), 13 mai 1911.

(15) Yellow oxide ointment. (Pommade à l'oxyde jaune.) *Gaz. des Hôpitaux*, 20 mai, 1911, p. 897.

(16) Wolffberg.—A new eye bandage for dispensary treatment. (Eine neue Augenbinde für Ambulante Behandlung.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 18 Mai, 1911.

(17) Westhoff, C. H. A.—Salvarsan in ophthalmology. (Salvarsan in der Augenheilkunde.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 25 Mai, 1911.

(18) Harry, Philip A.—Carbon dioxide snow for ulcers of the cornea. *The Prescriber* (Edinburgh), June, 1911.

(1) **Schiele** describes the case of a girl of 17, who had a milk-white cataract in a completely blind eye, while the other eye was perfectly normal. Subconjunctival injections of 1 c.cm. of sodium iodate (1 : 1000) solution, with one drop of a 1 per cent. solution of acoin, were given twice weekly for six months. Potassium iodate was administered internally. By the end of the injections, the pupil had become perfectly clear and black, but the fundus could not be seen, owing to vitreous opacities. A year later, the pupil was again occupied by a white opacity. Needling revealed calcareous deposits in the capsule. On extraction, the lens was found to be clear, and the second opacity due to the capsule. Atrophy of the optic nerve with syphilitic

retinitis pigmentosa were found. The girl stated that when she was 13 years of age, the vision had been lost in the course of a very short time, and the cataract followed. A tolerably complete *résumé* of the recorded cases of spontaneous and artificial absorption of cataract is added.

W. Inglis Pollock.

(2) In a review of an earlier article by **Oppenheimer**[1] in which he advised the employment of a 1 per cent. solution of atropine for iritis, two drops being given 3-5 hourly and continued during the night, Sommer[2] wondered if he did not see symptoms of poisoning oftener than in one patient.

In the present article Oppenheimer states, in reply, that if the pulse is watched during the continuous application of atropine by the doctor in his own room, the possibility of severe symptoms of intoxication will be prevented. It is well-known that there is an individual susceptibility to atropine, which is quite independent of the variability of the drug itself. Age and general constitution are very important factors in guiding the prognosis, although there is an inexplicable minority of cases which present a great idiosyncracy, while many patients show an absolute indifference or toleration. In illustration of the last point, mention is made of a man who had total seclusio pupillæ. After repeated application of atropine and cocaine at ten minute intervals for three hours, two granules of atropine were placed on the conjunctiva without any toxic appearances, and complete dilatation of the pupil was obtained as the result of the subsequent treatment. The question in these cases is whether a complete recovery is desired or not. A certain risk attaches to all treatment, and "without risking something, nothing is gained." With children and weakly or senile individuals the oculist must use the greatest caution. Further, Oppenheimer adds that the first article was intended to attract the attention of writers of text-books, who frequently give the most vague directions as to the treatment of iritis, and when a more explicit direction is furnished, *e.g.*, "the maximum of 8-10 drops of a ½ per cent. solution for the day," it is obviously insufficient.

W. B. Inglis Pollock.

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2. **Sommer.**—*Wochenschrift f. Therapie u. Hygiene d. Auges*, Mai 19, 1910.

(3) **Genty** directs attention, in *La Clinique* (cited in the *N. Y. Med. Jour.*, 3rd Sept., 1910), to the advantages of scarlet red as a non-irritating, inodorous application in certain eye affections, its use being especially indicated when a rapid proliferation of epithelium is desired. Applied as an ointment in the strength of 1 per cent., it is less irritating than the mercurial ointments ordinarily employed in suppurative infective conditions of the cornea, although its action is less powerful. It appears to be especially effective in the treatment of inflammation of the eyelids and of corneal ulcers, whether of traumatic or spontaneous origin.

The following formula has been found to give the best satisfaction :—

Scarlet red	grs. 3
Wool fat	drs. 5
Petrolatum	drs. 4

This is applied to the eye twice daily in the same way and in the same amount as ointment of mercuric oxide.

Members of our staff have done some experimental work with scarlet red ointment in the treatment of ulcers, but have not found it entirely satisfactory on account of the irritation produced, this sometimes being extreme.

(4) **Stuelp** gives in the first of these papers a description of "Salvarsan,"

with full details of the methods of administration. The second paper contains a review of the published papers grouped under: (1) results in other diseases; (2) toxic complications; (3) prophylactic effects; (4) relapses; and (5) results in diseases of the eye. These were summarised in a later paper, of which an abstract was given earlier (THE OPHTHALMOSCOPE, June, 1911, p. 456). A very full bibliography is appended. W. B. INGLIS POLLOCK.

(5) **Cohn** reports a case of severe acute iritis developing six or seven weeks after an injection of "Salvarsan," which had been given for a skin eruption in the Berlin clinic for diseases of the skin and sexual organs. As the patient had to be admitted into the wards and thus passed out of his control, the result of treatment cannot be communicated. W. B. INGLIS POLLOCK.

(6) **Nacht** reports the result of treatment by "606" of 13 cases of ocular syphilis with positive Wassermann reactions from Professor Fröhlich's *klinik* in Berlin. The method followed was the subcutaneous injection of Wechselmann's neutral emulsion in the interscapular region. In ten cases there was absolutely no result. Of these 3 were tabetic and 2 appeared to be latent tabetics. Of the other five cases 3 had severe keratitis parenchymatosa; 1 was a chronic iridocyclitis specifica; and 1 had vitreous opacities, besides tabetic appearances.

Of the 3 cases of apparent success, 1 was an iridocyclitis, in which vitreous opacities in the less affected eye cleared up rapidly a few days after the injection. The worse eye improved slightly. The second case was a paralysis of the accommodation which had already commenced to improve, and it was therefore uncertain how far the recovery should be ascribed to the "Salvarsan." The third case had also a one-sided paralysis of accommodation and sphincter pupillæ; the latter recovered, but the ciliary muscle was unaffected. Nacht wonders if intra-venous injection could have given better results. These tabetic and keratitis cases have been reported by others as not reacting to "606" (*See* THE OPHTHALMOSCOPE, June, 1911, p. 456).

W. B. INGLIS POLLOCK.

(7) The reviewer has read with very great interest the address by **Sir Victor Horsley**, of London, in which the expectant treatment of intracranial tumour, when such expectant treatment is unduly prolonged, is severely condemned. Since, however, the address contains hardly any direct reference to eye symptoms of themselves, and is primarily of interest to the physicians and surgeons upon whom falls the task of deciding the momentous question of operation or no operation in these cases, it may be sufficient to give in his own words Horsley's concluding paragraph, and to refer the reader to the original for the main argument.

This concluding paragraph refers to the treatment of syphilitic optic neuritis and is as follows:—

"The occurrence of optic neuritis in a syphilitic subject is frequently regarded as a local manifestation of the infection and treated as such. I wish to suggest for discussion whether such optic neuritis is not always a concomitant of subacute meningitis. A near parallel to such a condition is the optic neuritis observed in children suffering from otitis media.

"With this view of the pathological causation of syphilitic neuritis, it is easy to understand that opening of the subdural space and irrigation with 1 in 1,000 sublimate lotion offers the best opportunity of a rapid cure of the condition.

"This is the case, and a simple subtemporal irrigation on one side will secure immediate, and, as far as I have seen, permanent, subsidence of the papillitis. Though 'syphilitic optic neuritis' often clears up satisfactorily, it has often the characteristic tendency of the disease to relapse, and also,

owing to its chronic duration under ordinary treatment, leads to a certain degree of atrophic injury of the nerve fibres. The irrigation method of treatment meets both these contingencies in the most efficient manner.

"I have previously directed attention to the beneficial results of treating spinal pachymeningitis cases by the irrigation method, and would now conclude by pointing out that in all syphilitic conditions of the nervous system the problem of rapid treatment is the same, namely, the local application of mercury, and this can be safely accomplished by subdural irrigation."

ERNEST THOMSON.

(8) **Erlanger**, who spends a part of each summer in Jerusalem, states that atropine poisoning is not a rare occurrence there. The earliest symptom is usually a scarlet blush on the face, which may extend to the chest and abdomen in many cases, and occasionally to the arms. Contrary to Colin (*La Clinique Ophtalmologique*, décembre, 1910), rapidity of the pulse often followed the erythema. Increased respirations sometimes occurred. Delirium was never observed (the reviewer has had two cases). One girl of 3-4 years fell into a deep sleep after almost every application of a $\frac{1}{3}$ per cent. solution. The atropine was always freshly prepared or very recent, and used in $\frac{1}{3}$, $\frac{1}{2}$, and 1 per cent. solutions. The toxic effects were to some extent associated with the cases where an infant's head had to be fixed, and it was difficult to compress the puncta and canaliculi. These erythematous cases occur frequently with the quacks and charlatans who abound in the East, and the condition is often mistaken for a malarial symptom and the patient given quinine. The rarity of severe effects, as delirium, should not be ascribed to a tolerance of the children; but to the small doses of the drug which were employed. Rachitic, tuberculous, anæmic children, or children weakened by malaria, are particularly sensitive to atropine, but in all cases careful compression of the puncta is required. W. B. INGLIS POLLOCK.

(9) **Oppenheimer**, replying to the above paper of Erlanger, considers the erythematous symptoms not of great importance, and the increased rapidity of the pulse, which is easily produced in enfeebled children, may mean nothing at all. He has seen them twice only in a very large hospital experience, and believes that they are rare after two years of age. He never gives more than one drop per hour before the age of one and a half. On the other hand, great tolerance is often seen. He has given to a child of seven with interstitial keratitis, six drops of a 1 per cent. solution within an hour. Treatment may nevertheless be rendered most difficult by such cases, and some details are noted of an infant of $2\frac{1}{2}$ months where the erythema and pulse rapidly forced treatment of synechiæ in a fresh iritis to be abandoned. He has seen in children, diarrhœa, and in adults, slight paresis of the bladder follow atropine, but which recovered without cessation of the drops. A continuous sleep of twelve hours followed dionin drops in a five year old boy.

W. B. INGLIS POLLOCK.

(10) **Kaz**, of St Petersburg, avoids the use of atropine, whenever possible, in the treatment of interstitial keratitis. Under atropin, he says, the cornea is apt to become more rapidly opaque than when this drug is not used. If he gets a case early he endeavours to abort it, and it is only when his method has failed and iridic complications are threatened that he resorts to atropin. In the initial period, then, of the malady, if there be any irritation, he commences with a collyrium of sublimate cocain:

R/ Hydrochlorate of cocain ... 0·2
Sublimate (1 to 5,000) ... 10·0

S.—Three drops to be instilled every three hours.

If in two days the disease has not yielded, he adds 1 per cent. pilocarpin, a

drop once or twice a day. If there be no irritation, he uses the pilocarpin from the beginning. ERNEST THOMSON.

(11) **Heckel** describes two cases in which he used extract of ciliary body subconjunctivally for months, without benefit. The first was a child of 13 attended to within 24 hours of the injury, and dismissed with the injured eye in a quiet condition. He returned five months later suffering from sympathetic ophthalmia. Large doses of salicylates were first tried, and then the extract was employed for three months, but without benefit. The second case was an adult whose injured eye had been removed for sympathetic inflammation of the fellow eye fifteen years previously. The extract was tried in the hope that the eye might permit an iridectomy, but the usual unfavourable result was obtained. A. J. BALLANTYNE.

(12) In **O'Connor's** case symptoms of infection began on the third day after operation. A culture of the pus was made, and four days later, a vaccine was ready for use. The first injection was made subconjunctivally, and the second, two days later, was made into the muscles of the arm. Improvement was immediately observed. After three more injections, the condition had cleared up, leaving a dense pupillary membrane. A. J. BALLANTYNE.

(13) **Kaz**, of St. Petersburg, reports half-a-dozen cases in which the iritis became worse while a 1 per cent. solution of atropine was being used, and improved with weaker solutions. The second patient, for example, a woman of 50 years age, had iritis glaucomatosa, the right eye being first attacked. Another oculist had employed eserine, and performed an iridectomy. When seen, the left eye was becoming painful, and the right still contained a hyphæma from the operation. Warm compresses were ordered for both eyes, and quinine bromide was given internally. Two days later, the pupil was contracted, great chemosis, and tension + 1. Since the other eye had been treated as glaucoma without success, the author decided to treat the left as an iritis. A 1 per cent. solution was applied with diligence; but new synechiæ developed, the pains increased, and the vision sank to counting fingers. The advisability of iridectomy was then considered. To reduce the congestion prior to operation, hot compresses of sublimate (1 : 5000) were applied; and a weak solution of atropine ($\frac{1}{4}$ per cent.) was given twice daily. To his astonishment, the iritis and chemosis began at once to decrease, the pupil dilated to full size within five days, and vision rose to 0.7. From several similar cases Kaz recommends nothing stronger than a $\frac{1}{2}$ per cent. solution of atropine for iritis; and if the tension tends to rise, he employs a $\frac{1}{4}$ per cent. He considers that the 1 per cent. solution of atropine irritated the iris in attempting to break down or to tear the adhesions; and that the principle "*primum non nocere*" must be obeyed. W. B. INGLIS POLLOCK.

(14) Ferro-saiodine is an iodobehenate of iron. Insoluble in water, it contains, in round figures, 25 per cent. of iodine and 5·6 per cent. of iron. Compresses of ferro-saiodine contain 0·50 of the compound, 0·125 of iron and 0·28 of iodine. This preparation has an agreeable taste, is well borne, and exercises a very favourable action upon children affected with scrofula or heredo-syphilis.

(15) Since the Codex of 1884 ordered vaseline to be used as the excipient in yellow ointment, there have been occasional complaints of painful smarting after the medicament has been applied to the eyes. The cause of the pain has been generally attributed to potassium or sodium retained by the oxide, and different methods of preparation have been suggested, notably by P. Carles (*Union Pharm.*, 1904, p. 273).

After ample experience, J. Romeyer, chemist-in-chief to the Grenoble Hospitals, has evolved a formula which gives entire satisfaction, more

especially in children, who no longer complain of pain after the application (*Union Pharm.*, 1911, p. 299).

Yellow oxide (not blackened) ... 5 grammes
Pure anhydrous lanoline ... ... 15 grammes

Place in a porcelain dish, well washed with hydrochloride acid and rinsed in non-ferruginous distilled water and dried.

The mixture is placed in a water-bath, and the oxide is *delaie à chaud* with a glass or porcelain pestle, and washed in the same way as the dish. The oxide is thoroughly mixed without taking any notice of its being changed to a light-red colour by heat, which disappears on cooling.

We then add :—

Extra white vaseline ... ... 80 grammes.

By these means we obtain a smooth ointment, which remains very homogeneous, without change or clotting with the lapse of time.

Some practitioners, especially in winter, prefer an ointment of which the fusion point is lower, capable of diffusing itself more readily when placed in the eye. It suffices to replace 10 grammes or more of vaseline by pure oil of vaseline. SYDNEY STEPHENSON.

(16) **Wolffberg,** of Breslau, has modified the eye bandage which he first described in 1904. It now consists of a pear-shaped piece of leather lined with lint. A black band passing between the leather pieces is of sufficient length for tying behind the head ; and allows as great a pressure to be applied as the surgeon desires. E. Sydow in Berlin, N.W. 6 Marienstrasse 10, supplies the bandage (50 for 11s.). W. B. INGLIS POLLOCK.

(17) **Westhoff**, of Bandoeng, Java, reports his results with "Salvarsan" in six cases. Intra-muscular injections of a neutral suspension were employed. Two cases of iritis or iridocyclitis showed no improvement, while one iritis gave the only success. A case of optic neuritis in one eye without sight showed a temporary improvement, but the vision was again lost, while the good eye became affected to a certain extent. Another case had choked disc in both eyes with vision 5/6 ; and constriction of the field of vision. On the sixth day after the injection, the patient became feverish, vomited, and lost consciousness for five days, passing urine and fæces involuntary. Two days after recovery of consciousness, the vision was suddenly lost and never regained. The last case, one of retinitis with hæmorrhages, seemed to undergo slight improvement ; but vision became worse.

After these results the author did not dare to repeat the experiments, and also because several of the patients showed improvement on a return to the usual anti-syphilitic remedies, especially with the subcutaneous injection of iodine preparations. It is doubtful, however, if the author is correct in ascribing the loss of sight in the case of choked disc to the remedy, as it may have been due to a septic complication. The "Salvarsan" *débris* had to be removed by operative interference. W. B. INGLIS POLLOCK.

BOOK NOTICES.

A Monograph on Albinism in Man. By KARL PEARSON, F.R.S., E. NETTLESHIP, F.R.C.S., and C. H. USHER, M.B., B.C.Camb. Drapers' Company Research Memoirs, Biametric Series VI from the Department of Applied Mathematics, University College, University of London. London: Dulan & Co., Ltd., 1911. Issued to subscribers only. (Text Part I and Atlas Part I.) Price 35s.

These two volumes are a first instalment of a work in which it is intended to collect a vast amount of material information concerning albinism, which has been put at the disposal of the authors in reference to their appeal to medical men and their friends in all parts of the world. The authors regret the necessity for issuing their work in sections, but state that the amount of the material and the cost of the publication require such divisions, and they express the "hope that the appearance of this section will to some extent direct enquiry into the channels where, we believe, from our experience, that observation and research will be most profitable."

The sections now issued embrace: (i) Introductory Chapter; (ii) Early Historical Notices; (iii) The Geographical Distribution of Albinism; (iv) The Albinotic Skin; (v) Leucoderma; and (vi) Partial Albinism, Piebalds. They deal with what may be termed the natural history aspect of the phenomenon.

In the introductory chapter a definition of albinism is considered—"How is albinism to be defined, and is the condition to be considered as a homogeneous and invariable state, or must one form several categories?" They reply that the definition of albinism as "the complete congenital absence of pigment from all parts of the human body" is easy of formulation, but difficult of realisation. Such a definition could only be maintained in the event of microscopic examination of all tissues where pigment is normally present. For example, they cite four cases on which examination of sections of the eyes in whole or part were made—in one no trace of pigment was found, in the others some pigment was found either in the iris epithelium or in the choroid, yet the subjects of these examinations were to all appearances complete albinos. They conclude "the test cannot be applied, and for practical purposes we are reduced to the non-visibility of pigment in the parts of hair and skin accessible and the characteristic eyes of the class, red pupils, and red, violet, or grey iris, nystagmus, photophobia, and defective sight." Also that such a condition is unmistakable, but not incompatible with the existence of scanty pigmentation evidenced on microscopic examination. Further, it is not a unit character; it may be apparent in one or two features only, and the intensity is variable with age.

The chapter on early notices of the occurrence of albinism is of interest if only as an example of how clear and precise descriptions of natural phenomena given by mediæval, and more recent travellers can be confused by home-staying men of science, to the end that a new mythology is spread abroad!

The chapter on the geographical distribution of albinism is a great piece of work. It enters into a detailed examination of records concerning white, yellow, red, and black skinned races, and sets in order an immense volume of observations of travellers, explorers, missionaries, and doctors gathered especially for this work. Such a record might seem dull and statistical to the last degree; but it is not so—it is full of the most pathetic human interest. What could be more disturbing to a dark skinned pair than the appearance

of their first-born of a hue such as none of their kind had seen before? It is no wonder therefore that the position of the albino is most varied; in some climes they have none, they are done to death at birth; in others they gain something of the position of the half-witted in our own mediæval history; in a few only do they receive special favour, and then it would seem when the proper white man was known of.

The general thought of mankind seems fittingly summed up in a Persian poem (quoted on page 161), composed about 1000 A.D. It recounts the birth of Zāl, the son of the warrior Sām.

"His hair was white as goose's wing,
His cheek was like the rose of spring,
His form was straight as cyprus tree—
But when his sire was brought to see
That child with hair so silvery white,
His heart revolted at the sight.
No human being of this earth
Could give to such a monster birth;
He must be of the Demon race,
Though human still in form and face.
If not a demon, he, at least,
Appears a parti-coloured beast."

His mother called him Zām, but the people said to Sām that it was an ominous event, and would be productive of nothing but calamity. Sām, owing to these reproaches, exposes the silver-haired child on the mountain Alberg, whence he is saved miraculously, and restored to the penitent but aged Sām.

"Dost thou believe
That to have silvery tresses is a crime?
If so, thy head is covered with white hair;
And were not both spontaneous gifts from Heaven?

The records of this chapter show how wide-spread is albinism; no country in which reasonable search has been made has failed to produce examples. On the influence of habitat, inbreeding, mixture of races, and special liability of certain races, the authors indicate "some contributory suggestions, if far from complete answers."

There follows a chapter on the albinotic skin in which much research is recorded. In conclusion, the authors write: "we throw out the suggestion as hypothesis, not as conclusion, that albinism is an hereditary defect of structure, and possibly only of superficial tissue structure, which interferes with the normal metabolic process by which pigment is produced and stored. The absence of pigment is a secondary result of the albinotic structure and not the primary source of the albinotic constitution."

Chapter V, on leucoderma, is of less interest, at any rate to an "eye man," except perhaps for the solitary and not wholly certified report that in a negress who became wholly white from leucoderma, not only were the skin and hair blanched, but "the retina had begun to lose its pigmentation and the eyes to be photophobic."

Chapter VI, on partial albinism, has all the interest that a collection of the most extraordinary of nature's freaks must ever excite. The occurrence of human piebalds, not merely in occasional individuals, and as the result of an obscure disease, but in whole families, many members of which exhibit strikingly marked 'flares' and white forelocks, possessed from birth until death, and handed on to their children and children's children with all the regularity of a truly dominant hereditary feature, is an extraordinary

exhibition of the tenacity of the germ plasm for some unknown blemish of its pristine purity. A fit subject doubtless for the romance of the novelist, or the speculations of a mediæval philosopher, but to us a wonder.

The authors state that the further sections of this work containing chapters on the Albinotic Eye in Man, on the Albinotic Hair in Man, on the Albinotic Eye and Hair in Animals are all "ready for press," and they hint that the issue of these subsequent sections will be expedited by additions to their lists of subscribers. N. BISHOP HARMAN.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. XXXI, Fasciculus 2, 1911. London: J. and A. Churchill, 7, Great Marlborough Street. Price 4s. net.

The second fasciculus of the *Transactions* of the Ophthalmological Society of the United Kingdom, issued to members on June 14th last, contains an account of the scientific business transacted at the meetings held in January, February, and March, 1911.

Transactions of the Fifteenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology. Held at Cincinnati, September 19th, 20th, and 21st, 1910.

Several of the articles published in this well-printed volume have already seen the light in the columns of THE OPHTHALMOSCOPE, notably Wendell Reber's presidential address, Stephenson's anniversary address, Vail's demonstration on the Smith operation, and Green's paper on the same operation, Fisher's communication on "The choice of a cataract operation," Casey A. Wood's curious case of atrophy of the iris, Keiper's review of Parinaud's conjunctivitis, Francis and Gibson's study of the anatomical relations between the sphenoidal sinus and the orbit, etc.

A System of Ophthalmic Operations. Edited and partly written by CASEY A. WOOD, M.D., C.M., D.C.L. 2 vols. Chicago, Ill., U.S.A: Cleveland Press. 1911.

This book is uniform with, and is meant to supplement, the *System of Ophthalmic Therapeutics*, already published by the indefatigable Casey A. Wood, of Chicago.

The first thing which strikes one about the work is its enormous proportions, consisting, as it does, of two large volumes, and containing 1,824 pages. But on opening the book, one finds that it is not only a record of the operations of the present day, but of every operation (more or less) that has ever been performed on the eye from the earliest ages, together with a short account of the anatomy, physiology, and pathology of the parts involved, and, what one would scarcely expect in a book on ophthalmic surgery, its forensic relations. The reason for the inclusion of the latter, as stated in the preface, being that "every American ophthalmic surgeon knows only too well that every time he essays an operation he invites a suit (or threatened suit) for malpractice."

In addition to the ophthalmic operations proper, Halstead has added a chapter on the surgery of distant organs that most commonly involve the eye. These include such operations as trephining for intracranial tumours, the removal of tumours of the pituitary body, thyroidectomy, etc. Although the preface states that these operations may be performed by ophthalmic surgeons, at any rate they are not practised in this country. But they are of interest as bearing on the subject.

For a similar reason the chapter added by F. E. Brawley of many complicated operations on the nose, although of interest, do not usually fall within the scope of ophthalmic surgeons.

In such a short review as this it is difficult to do justice to the many eminent contributors to the volume, all of whom are American.

The book is divided into eight parts and subdivided into chapters. It commences with biographical sketches of historical interest up to the time of Donders written by Frank.

Part II consists of the forensic relations of ophthalmic surgery by Thomas Hall Shastid. As might be expected, this chapter applies principally to the laws in the United States.

The first portion of Part III is on the development of operative skill on the part of the ophthalmic surgeon by A. E. Bulson, a chapter which will be very useful to beginners in ophthalmic surgery. It describes the methods of holding instruments, the care which should be taken of both the surgeon and the patient, followed by an account of how to operate on animals' eyes.

Next comes the preoperative *technique* of ophthalmic surgery by W. Gordon Byers. This deals with the preparation of the patient, the surgeon, the instruments, etc. Although this is quite up-to-date in most respects, and is an admirable chapter, a few details, such as irrigation of the conjunctival sac for several days before an intra-ocular operation is performed, to reduce the number of organisms, and inspection of the teeth for pyorrhœa, etc., are omitted. In the sterilisation of cutting instruments, alcohol alone is recommended when boiling is not employed. No mention is made of pure carbolic acid, with the subsequent use of alcohol. The attire of the surgeon and assistants is very completely described and the use of a face mask recommended, a point of importance which is not sufficiently recognised in this country.

The after-treatment of ophthalmic operations is next treated by E. C. Ellett. This chapter deals mainly with those of general surgical procedures, the local ones being also described, but these are usually found after the operations. The matter which this chapter contains is mostly afterwards repeated, sometimes more than once.

Then follows a chapter on the electrical appliances used in ophthalmic surgery by Edgar S. Thomson. It contains a description of the cautery, X-rays, and transilluminator. The latter is illustrated by a number of coloured plates, which, unfortunately, do not convey much to the reader.

Anæsthesia, local and general, by Wendell Reber is next dealt with. It contains an excellent article on regional anæsthesia by subcutaneous injection. Novocaine and adrenalin are preferred by the author and injected over the situations of exit of the branches of the fifth nerve around the orbit.

The chapter dealing with the procedures employed in minor ophthalmic surgery is written by the editor, Casey A. Wood.

Paul Guilford deals with the instruments, ancient and modern, which have been used in ophthalmic surgery.

In Part IV. commences the ophthalmic operations proper as usually described.

F. Allport deals with enucleation and its substitutes, amongst which is his own particular operation for skin grafting a cornea over a blind stump, so that an artificial eye can be worn over it. It does not seem to have many advantages over Frost's operation.

G. S. Derby deals with the treatment of epibulbar tumours, and E. Jackson with operations on the extrinsic or orbital muscles. He deals very extensively with the anatomy and the effect of division and advancement of

the ocular muscles. Tendon lengthening and transplantion are also discussed.

The surgical treatment of injuries to the visual apparatus is next treated by H. V. Würdemann. With the exception of an interesting article on the covering in of corneal wounds by conjunctival flaps, it is mainly a repetition of other portions of the book.

Part V., by the editor, deals with operations on the orbit, and is mainly occupied by anatomy and a description of Krönlein's operation.

Part VI. contains the operative treatment of pterygium by W. T. Shoemaker; the operative treatment of trachoma by J. Green; and the surgical treatment of corneal ulcer and fistula by H. B. Chandler. In this chapter it is regrettable to see that the term "rodent ulcer" of the cornea is still applied to Mooren's ulcer, and the omission to mention the use of zinc ionisation as a remedy is unfortunate. The author relies on the actual cautery, a very uncertain measure.

Operations on the cornea are by C. A. Oliver.

The operation for conical cornea is by W. O. Nance. It deals principally with cautery and trephining operations. The excision of the apex of the cone is very cursorily discussed, and although Higgens' results are quoted, those of a more recent date, such as Morton's and Archer's, are not mentioned. Little or nothing is said of the glaucoma which so frequently follows these operations.

Iridectomy, irodotomy, and allied operations are dealt with by A. Alt.

The operative treatment of glaucoma is by W. C. Posey. It contains nothing new in the treatment; indeed, Herbert's latest operation for the formation of a cystoid cicatrix, which has yielded such brilliant results, is not even mentioned. The article is illustrated with micro-photographs by E. Treacher Collins taken from his article in Posey and Wright's text-book. In performing iridectomy the author seizes the iris near its pupillary border, not near the base, as is usual for the production of the dialysis before removal.

The extraction of senile cataract is by the editor. The extraction of cataract in its capsule is by D. W. Greene, and contains some very good illustrations of Smith's method.

Discission and other cataract operations are by P. Callan.

The chapter on operations for after-cataract is written by Myles Standish.

Operations on the retina is by the editor.

Plastic operations, by C. H. Beard, are well described and illustrated. The same may be said for the operation for ptosis by W. H. Wilder.

The operations on the lacrymal apparatus are described by H. F. Hansell and J. H. Bell.

The book, as a whole, is a tolerably complete record of all the operations that have been performed on the eye, the main trend being towards Continental *technique*. It does not contain many new methods, but is a most useful book of reference. It is full of repetitions (a thing almost impossible to avoid when compiled by so many authors), and, from the point of view of a practical ophthalmic surgeon, is somewhat wanting in the indications when to use certain operations. It is a book purely for the specialist.

The printing and illustrations, of which there are upwards of one thousand, leave nothing to be desired. STEPHEN MAYOU.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

HARTRIDGE'S REFRACTION OF THE EYE.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

May I be allowed to correct an error in your reviewer's notice of Mr. Hartridge's book, "The Refraction of the Eye?" I have not had an opportunity of seeing Nagel's original paper, but all authorities now agree in considering the unit metre angle as that indicated by Mr. Hartridge. The unit metre angle is that angle through which *each fixation line* sweeps in moving from parallelism to view a point in the middle line one metre distant from the centre of motility of the eye. Thus, when the object is one-third of a metre distant, an emmetrope exerts 3D. of accommodation, and 3 m.a. of convergence with *each* eye, if the object be at an infinite distance, both the accommodation and convergence exercised are denoted by the same symbol $\frac{1}{\infty}$ or O. The distance is measured along the slanting line from the object to the eye, and therefore if h denotes half the interocular distance and if d denotes the distance of the object from the centre of motility

$$\frac{h}{d} = \sin \theta$$

where θ is the metre angle. The reviewer is in error when he says

$$\frac{p}{d} = \tan \theta$$

Again, Mr. Hartridge uses the analogy of the lens on p. 22 to convey to the student's mind what is meant by the compound refracting system of the eye. For exact calculations the analogy is faulty, but Mr. Hartridge never suggests its use for these purposes. Some problems would require the representative lens to be of the anterior, some of the posterior focal length of the eye, while many cannot be solved by any representative lens. Mr. Ettles says "the equivalent lens of the human eye is the inverse of the anterior focal length" (*sic*). If I am right in thinking that he refers to the power of the lens, a simple example will show that there is no such thing as an equivalent lens. What is the increase in length of an axially myopic eye of —4D.? We all know that it is given by the formula

$$l = \frac{f\ f''}{1000} \mathrm{D} = \frac{(15{\cdot}54)\ (-20{\cdot}79)}{1000} (-4) = {\cdot}323 \times 4 = 1{\cdot}292 \text{ mm.}$$

Now in the "equivalent lens" of Mr. Ettles $f' = 15$ mm. and $f'' = 15$ mm., therefore

$$l = \frac{(15)\ (-15)}{1000} (-4 \text{ D.}) = 225 \times 4 = {\cdot}9 \text{ mm}$$

a result that is clearly wrong.

It is true that a diminution of the refractive index of the aqueous and of the vitreous will cause "index myopia" if the index of the lens has remained unchanged, but it is not such an obviously simple matter as the reviewer indicates.

When Tscherning's accurate figures are used, the normal index of the aqueous and vitreous is 1·3375 and the relative index of the lens is 1·0743. Now suppose that the first index is reduced to 1·3; it will be found that although the corneal refraction is diminished, the power of the lens is so increased as to cause altogether a myopia of more than 5D.

I may also point out that the errors regarding ∞ and O do not occur in Landolt's chapters in the *Traité Complet d'Ophtalmologie*, although several errors may be found in the English translation.

Yours faithfully,

ARCHIBALD STANLEY PERCIVAL.

NEWCASTLE-ON-TYNE.

P.S.—Since writing the above, I have seen Nagel's chapter on "Die Anomalien der Refraction und Accommodation,"* published in 1880. He not only describes the metre-angle as I have done, but on p. 481 shows that when the interocular distance is 64 mm. the metre-angle is 1° 50′. I cannot imagine from what source Mr. Ettles drew his information about Nagel's work "when he introduced his unit in 1880."

To the Editor of "THE OPHTHALMOSCOPE."

SIR,

The success of Mr. Percival's attack on my review of Mr. Hartridge's excellent book depends wholly on his own accuracy and that, I regret to say, must be seriously disputed.

(1) The metre-angle was referred to by the author in these terms (p. 42) "Nagel has proposed . . . the metrical angle." What is dealt with is avowedly Nagel's angle, and it is a unit or single expression, not a congeries of angles. Mr. Percival, while admitting that he has not referred to Nagel's definition, states that "all authorities agree" in defining it another way. That is beside the mark, for if we are not dealing with Nagel's proposition, as is explicitly stated, what are we discussing? Nor could I admit that "all authorities" share the general misconception. To begin with, one finds that while there are many writers, there are few—very few—authorities. Happily, Mr. Percival refers to Professor Tscherning, one of the most distinguished of living authorities, and I will take him throughout on the facts of his quoted author. Mr. Hartridge gives the numerical value of the metre-angle as 1° 50′ for a base line of 64 mm. Tscherning says "a metre-angle corresponds to 3° 40′ for a person with a base line of 64 mm." In my review, using the trigonometrical equation that Mr. Percival says is "in error," I, too, got 3° 40′. Convergence is a *binocular* state, and the angle subtended by the intersection of the visual axis at the fixation point is the *sum* of the deviation the eyes have undergone in moving from the primary position. To dissect this angle is to rob Nagel's idea of its sole recommendation.

(2) I fear that Mr. Percival does not understand the meaning of "the equivalent lens." He calls it the representative lens, and concludes that "there is no such thing." So far he is right. This optical Mrs. Harris is an expression of total power.

As Prof. Silvanus Thompson says of it, in his "Optical Tables and Data" (p. 54) "In many optical instruments, two or more spherical lenses are placed in position, properly centred on the same axis, and at a distance from one another. In such cases the question often arises: What single lens—if any—would be equivalent to the system? This "equivalent lens" *could not in all cases be constructed*, even if aberrations were absent." When considering the power of a homocentric series like the eye, we may not take its posterior focus for that lies in a different medium. But if we reverse the path of transmission it will not matter whether rays are parallel in vitreous or in the air, so long as they are parallel. We then measure the focal length *in air*, and the

* *Handbuch der Ges. Augenheilkunde*, Graefe and Saemisch, Bd. VI, S. 478 *et seq.* 1880.

convergence can be represented by an equivalent lens, also acting on parallel light and having its focus in air. My objections to Mr. Hartridge's statement that we might consider the eye as "a lens of 23 mm. focus" was that the power of such a lens represented that of the cornea alone. If Mr. Percival will refer to Tscherning he will find that the power of the cornea is 42D., and, if he will "neglect thickness" and divide 1000 by 23 he will get 43D. approximately. He will find also that the power of the whole eye is given as 59D. Such an equivalent lens has a focal length corresponding to what I said its true value was, *i.e.*, the *anterior* focal length of the eye. Such being the case, it is hardly necessary for me to deal with Mr. Percival's figures of the myopic eye. They are certainly "clearly wrong," but whether the authorship of the error is correctly imputed to me is for your readers to judge.

(3) *Index myopia.*—Mr Hartridge states that lowered index of aqueous and vitreous is a cause of hypermetropia. As a reviewer, I could not pass this, and briefly showed that myopia would result. Mr. Percival intervenes to say that the myopia would be "more than 5 D." The observation seems to lack something in relevancy. He, however, becomes interesting in his figures, although he misses out the calculation. "When Tscherning's accurate figures are used, the normal index of aqueous and vitreous is 1·3375, and the relative index of the lens is 1·0743." He will find if he consults Tscherning again, that the indices of the fluid media are 1·3365. The figure 1·3375 was an empirical one adopted by Javal for convenience in calibrating the ophthalmometer, and *it includes the cornea.* In no place does Tscherning give the figure as that of the indices alone.

The absolute index of the lens, corresponding to the above 1·0743 is 1·437. This is *mentioned* by Tscherning as the result calculated, not measured, by Matthiessen. Tscherning explicitly rejects it as a reliable figure, and says "awaiting the result of new measurements I adopt the number 1·42." In my review, this was the figure I used. Yours faithfully,

WILLIAM ETTLES.

LONDON, W.

FILTERING AND FISTULOUS CICATRICES.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

At the risk of being somewhat tedious, I should like to clear up one point discussed by Major Elliot in his paper in the May number of THE OPHTHALMOSCOPE. I wish to justify the distinction which I have drawn between filtering and fistulous operation scars, somewhat to the disadvantage of the latter.

Now that the relief of glaucomatous tension by means of imperfectly healed wounds is receiving general attention, some classification of the scars becomes desirable because of the clinical differences in the results. We cannot continue to classify a wide free subconjunctival fistula, by which the eye is very much softened (*e.g.* Major Elliot's case giving a reading of 5 mm. on the Schiötz tonometer 6½ months after operation), with a narrow linear cicatrix leaking sufficiently for the reduction of plus tension, but free from all risk of excessive leakage. Where is the line to be drawn between the two? Whether in the linear cicatrix the filtration is uniform, or takes place through one or more minute fistulous points, is clinically a matter of indifference, though pathologically the question is of considerable interest.

Pending anatomical demonstration of true filtration or leakage through loose tissue, there is considerable reason for assuming its existence. Take the final result of a cataract extraction in which the sclero-corneal wound has

gaped under a too complete conjunctival flap. We find under the conjunctiva in the position of the central third or so of the original wound, a broad uniformly grey line tapering to either end. The conjunctiva over and about the scar is moderately œdematous, from filtration of aqueous. The tension of the eye may be normal or slightly sub-normal. The œdema is not more marked about one portion of the line than another. It may, in some cases at least, be somewhat increased by finger pressure on the globe through the lower lid for a minute or less. This pressure also reduces the tension of the eye.

The surfaces of the wound have evidently not been drawn together at all. The corneal astigmatism produced by the original separation of the sclero-corneal incision persists unaltered. The gap has been filled up or bridged over by thickening and condensation of sub-conjunctival (? and conjunctival) tissue, and this proliferated tissue shows none of the contractile property of true scar tissue. Why should not the aqueous pass through this thickened tissue in the same way that it diffuses through the neighbouring sub-conjunctival tissue? Why and how should a series of small fistulæ form throughout the somewhat condensed tissue to provide the limited filtration which takes place—a filtration entirely unnecessary and objectless? If some points of the cicatrix were definitely more pervious than others, one would expect clinical evidence of it, for some of the fistula with which we are acquainted clinically are quite minute. The same observations apply equally to the cicatrices found after many successful iridectomies for glaucoma. The whole length of the original incision may remain visible as a perfectly uniform narrow grey line under a more or less œdematous conjunctiva. A similar result is seen generally after "small flap" sclerotomy, though in some cases small fistula form. After some of these operations, though the cicatrix remains visible, and though the abnormal tension is satisfactorily reduced, there is no conjunctival œdema.

The argument that we know of no filtering cicatrices elsewhere in the body is not of great weight. As has been said by Holth, we can the better understand imperfect healing in a sclero-corneal wound, bathed in aqueous, since Thomson Henderson has shown that a cut iris may remain permanently unhealed.

I am, etc.,

H. HERBERT.

NOTTINGHAM.
June 20th 1911.

NOTES AND ECHOES.

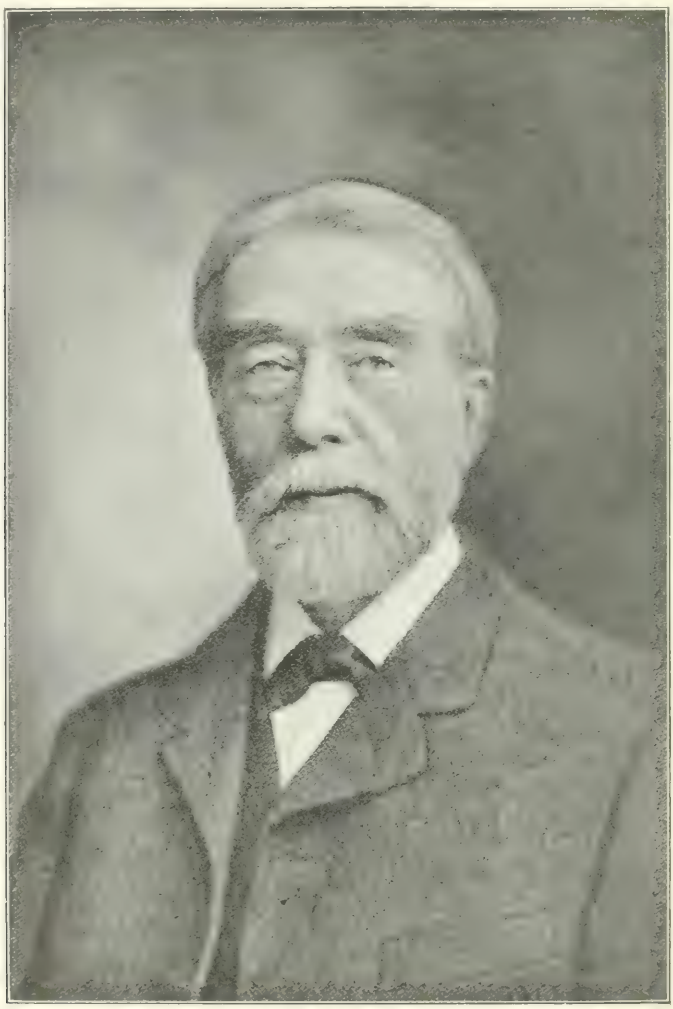
Hermann Knapp: born 1832, died 1911.

Death.

As briefly announced in the last number of THE OPHTHALMOSCOPE, Hermann Knapp, emeritus professor of ophthalmology in the College of Physicians and Surgeons of New York, died at Mamaroneck on May 1st, from pneumonia, after an illness of brief duration.

Any attempt to trace Knapp's career would be to write the history of contemporary ophthalmology. We can only give the outstanding facts of a busy life.—Knapp was born of wealthy parents on March 17th, 1832, at Dauborn, Hesse Nassau, Germany, and he graduated from the University of Giessen at the age of twenty-two years. He then studied under various masters of ophthalmology in London, Utrecht, Munich, Würzburg, Paris, Berlin, Vienna, and Leipsig. He next qualified as *privat-dozent* in Heidelberg, where he founded the *Augenklinik* (1862), and was eventually appointed

professor of ophthalmology (1864). He acquired great renown as an investigator, a teacher, and an operator. In 1868 he paid a visit to New York, and what he learned on that occasion induced him (despite protests from his Heidelberg colleagues and students) to transfer his sphere of usefulness from Heidelberg to the great American city, where he founded the New York Ophthalmic and Aural Institute. It was not long before he succeeded in



THE LATE HERMANN KNAPP.

laying the foundation of a great private and hospital practice in eye and ear work, which he retained until a few years ago, when the infirmities of age forced practical retirement upon his unwilling and still energetic personality. In 1882 he was appointed Professor of Ophthalmology in the New York University Medical College, and six years later he obtained a similar position in the College of Physicians and Surgeons. For many years Knapp's was the outstanding and representative figure in American ophthalmology. His advocacy of the simple extraction of senile cataract did much to rehabilitate that operation both in America and Europe. This untiring worker founded in 1869, with Professor Moos, the *Archives of Ophthalmology and Otology*, the

English counterpart of the *Archiv für Augen- und Ohrenheilkunde*, which a few years later, under the inspiration of Professor Hirschberg, of Berlin, resolved into two separate periodicals, one dealing with the eye and the other with the ear. In his best days, he was a superb operator. The keynotes of Knapp's character may be summed up as modesty, kindness of heart, ability, energy, and a truly scientific mind.

The death is announced of Albert Corner, at the age of 45 years. He had been senior clinical assistant at Moorfields Ophthalmic Hospital.

Dr. Dastot, of Mons, once president of the Belgian Ophthalmological Society, is dead.

* * * *

Appointments and Honours.

MR. LESLIE PATON has been appointed ophthalmic surgeon to St. Mary's Hospital, London.

Mr. Bernard Cridland, D.O., has been appointed surgeon to the Wolverhampton and Midland Counties Eye Infirmary.

The title of professor has been bestowed upon Dr. Stargardt, of Kiel, and Dr. Paul Erdmann, of Rostock.

Dr. Richard Cords has been recognized as *privat-dozent* of ophthalmology in Bonn, and Dr. K. H. Sattler in Königsberg.

Dr. A. Cantonnet has been nominated ophthalmologist to the Paris hospitals.

* * * *

Scottish Ophthalmological Club.

THE inaugural meeting of the Scottish Ophthalmological Club was held in the eye department of Edinburgh Royal Infirmary, on May 26th last. The meeting, which was attended by ophthalmic surgeons from the Scottish cities, was a success from the social as well as from the scientific standpoint.

* * * *

Camorrist's Glass Eye.

STRANGE are the uses of adversity, but stranger still are the uses of a glass eye, if a report from Viterbo, Italy, is to be believed. The scene occurred at the interminable trial of the thirty-six alleged leaders of the Camorra secret society, who are charged with complicity in the murder of the ex-Camorrist Cuocolo and his wife, the "beautiful Sorrentina." Esposito, the famous Camorrist usurer, set up an *alibi* as his defence. Whilst under cross-examination, the prisoner became wildly excited, and suddenly took out his glass eye and threw it on the floor of the Court, "his face," according to the account, "presenting a horribly disfigured appearance." Esposito then fainted.

* * * *

Oxford Ophthalmological Congress.

THE Oxford Ophthalmological Congress will assemble at Kebie College, Oxford, on Wednesday, July 12th next, and the meeting will be held on Thursday, the 13th, and Friday, the 14th of July.

* * * *

The Heidelberg Society.

THE Heidelberg Ophthalmological Society will meet from August 3rd to August 5th. Secretary: Dr. Wagenmann, Heidelberg.

* * * *

Claim Against an "Eye Specialist."

IN the Manchester County Court, William Hodson, a signalman living at Bolton, recently claimed £100 damages from William Mellor, described as an "eye specialist" practising in Oxford Road, Manchester. The plaintiff alleged that by representations as to treatment he was put to a cost of £16 13s. 6d. and had suffered pain and loss of health, and damages were

claimed for negligence. The defendant, of course, was not a registered practitioner, and did not hold any medical or surgical qualification. From the evidence it appeared that eight years ago the plaintiff was operated on for cataract of the left eye by Dr. Parker at the Bolton Infirmary. His other eye became affected in 1908, and he was induced to consult Mellor by seeing a newspaper advertisement by the defendant, who claimed to cure diseases of the eye "without resource to the knife." The eyes were treated with "drops," said by the defendant to be of oil of anemone, but according to the evidence of a London analytical chemist, to consist of 98 per cent. of olive oil and 2 per cent. of the extractive matters of pulsatilla. After about six months' treatment the fatuous signalman was induced to write Mellor a recommendation to the effect that he had been cured of cataract, thanks to the defendant's skill. But, finally, after attending once a month for two years and parting with upwards of sixteen pounds, the signalman was informed that he would have to go to the surgeon who had operated upon the other eye. Medical evidence in support of the plaintiff was given by Drs. Hill Griffith, Gray Clegg, and Parker, and Mr. C. Worth, all of whom agreed that cataract could be cured only by surgical operation. Verdict for plaintiff for £30 and costs on the highest (C) scale.

* * * *

General Medical Council and Ophthalmology.

At a meeting of the Executive Committee of the General Medical Council recently held in London a communication was considered from the Council of the British Medical Association transmitting the following resolution, copies of which were being forwarded also by the Association to the universities and other medical schools and examining bodies in the United Kingdom:

"That it is desirable that diagnosis and treatment of disease of the eye, including the estimation of refractive errors and retinoscopy, should be compulsory subjects in every medical curriculum, and that every student should undergo a practical examination therein."

The Executive Committee resolved to direct attention to the report of the Education Committee approved by the Council on November 26th, 1910, which contained the following passage:

"In the curriculum of all the licensing bodies, with three exceptions, special courses on ophthalmology form an essential part. The committee are of opinion that every student of medicine should receive some special instruction in the subject. The committee do not think it necessary to insist that every student should be examined in ophthalmology, but they are of opinion that all students should be liable to be examined in some branch of the subject."

* * * *

Paris Ophthalmological Society.

DR. CAILLAUD has been elected a titular member (*membre titulaire*) of the Paris Ophthalmological Society.

* * * *

Central Midwives Board.

AT a meeting on May 30th, the Central Midwives Board directed the name of Fanny Lestchick to be struck from the Roll of Midwives. The charge was that being in attendance as a midwife at a confinement, the child suffering from inflammation of one eye, she did not explain that the case was one in which the attendance of a registered medical practitioner was required, nor did she hand to the husband or other relative or friend the form of sending for medical help, properly filled up and signed by her, in order that this might be immediately forwarded to the medical practitioner, as required by Rule E 19 (5) of the Board.

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ORIGINAL COMMUNICATIONS

ON X-RAY LOCALISATION OF OCULAR FOREIGN BODIES AND THEIR EXTRACTION FROM THE VITREOUS,*

BY

Dr. S. HOLTH,

CHRISTIANIA, NORWAY.

I HAVE taken the greatest interest in Dr. Mackenzie Davidson's several communications,[1,2] and his excellent radiograms are above praise, and his method of localisation is unassailable from a geometrical point of view.

Fig. 1.—Leaden button for X-ray localisation, ten times enlarged and also of natural size. (The button is much thinner than it seems in the small profile drawing.)

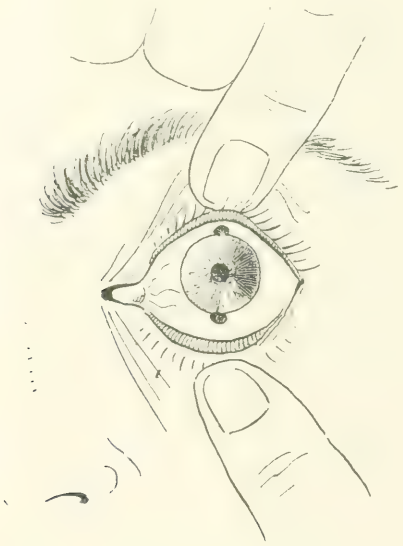


Fig. 2. The two leaden buttons in place.

Up to the year 1902 I tried several methods, all in themselves good, but I was often in doubt as to the exact site of the foreign body, because the localisation was not in relation to any fixed point on the surface of the eyeball.

Since then I have published several communications ([4, 6, 8, 10]) on this subject in Norwegian, German, and French journals.

*Read at the Oxford Ophthalmological Congress, July 21st, 1910.

Having improved my localisation globe and my different extraction forceps, and believing the method to be little known in England, I will now give a short description of it, accompanied by illustrations, some new and some old.

My method lies in the fact that a small plano-convex leaden button of 2 mm. diameter (Fig. 1) is fastened by the help of a fine black silk suture,* into the conjunctiva limbi at the upper and lower ends of the vertical meridian (Fig. 2).

The patient, seated in a common chair, fixes his head immovably by biting a metal spatula covered with sterilized gauze and fixed to an apparatus for carrying two photographic plates (Fig. 3 and Fig. 4). He looks at a small object at a distance of two metres (best a small white spot on a black disc in the top of an iron stand whose height can be varied—(*See* Fig. 3) at the same height as his eyes, while three or more photographs are taken, two of them bitemporal, the third occipito-frontal. The Crookes' tube ought in all exposures to lie in the horizontal plane through both eyes, $\frac{1}{2}$ metre from the injured eye.

Fig. 3. Apparatus for fixing the patient's head while the X-ray photograph is being taken, showing the occipito-frontal exposure for the left eye. Notice the oblique position of the plate against the left side of the nose; by this means the plate can be placed very near the orbital border. (To compare with the oblique position of the frontal plate for the right eye shown in Fig. 15).

For the bitemporal exposure the plate (13 cm. × 18 cm.) lies in the frame of my head-fixing apparatus (Fig. 4) against the temple of the injured eye, while the Crookes' tube is on the sound side; first, in the prolongation of the line connecting the centres of the two eyeballs. When the first plate has been

*The small leaden buttons should be ready for use with a fine black silk thread drawn through the two fine holes in them (Fig. 1). They should be sterilized by boiling, and not by hot air at 160° C.

taken, the Crookes' tube is removed 7 centimetres backwards in a sagittal direction for a second temporal exposure.*

For the occipito-frontal exposure the Crookes' tube is placed behind the patient's neck in the horizontal sagittal line through the centre of the injured eye, while the plate (9 cm. × 12 cm.) is hanging in the feather forceps of my fixing apparatus in an oblique position (Fig. 15) close to the orbital border (Fig. 3).

Fig. 4. The same apparatus as in Fig. 3 here showing the bitemporal exposure.

During all exposures (temporal and frontal) the patient's face ought to be turned slightly downward, and, consequently, the eyes turned slightly upward for the horizontal fixation. By this means the rays from the Crookes' tube at the same height as the eyes pass under the brain during the occipito-frontal exposure.

The latter does not generally give such good detail of the bone structure (see, however, Fig. 15, where the two frontal sinus and the septum are seen in the original plate), as the temporal plates, but the shadows of the foreign body and of the two leaden buttons are at any rate distinct enough to allow of the distance being measured from each other. It has sometimes happened that I have even recognised the two fine holes in the leaden buttons on the frontal plate.

I believe that this will happen still more frequently, when the time for exposure (hitherto 5 or 10 seconds for the temporal and 30 or 60 seconds for the frontal plate) can be considerably diminished by instantaneous X-ray photography. Unfortunately, the Crookes' tubes for this method have not yet been obtained by the Hospital where I perform my operations.

The distances between the shadow of the buttons and that of the foreign body is measured directly on both plates with a millimeter rule. The dimensions, as shown in the plates, exceed by about 10 per cent. the real

* By this means a stereoscopic examination of the two plates can be made in cases where the occipital-frontal exposure has been doubtful or unsuccessful.

dimensions, because of the distance which separates the buttons and the foreign body from the plate. The measurements are then translated with two ink spots on to the surface of a metal globe of 24 millimeters diameter (Fig. 5), in which the outlines of the pupil, the limbus, and the two leaden buttons are engraved. I have abandoned the loose metal rings which I used at first. I have now engraved a furrow corresponding to the vertical meridian of the eye, and two horizontal furrows corresponding to the places of the leaden buttons.

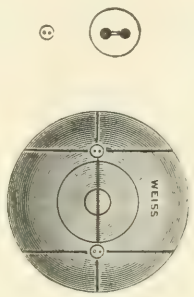


Fig. 5.—New pattern of metal globe for localisation of foreign bodies in the eye. (Above are diagrams of the leaden button in natural size and enlarged.)

The position of the foreign body corresponds to the intersection point of three planes imagined through the two ink spots on the localisation globe (Fig. 5). Through the ink spot corresponding to the measures on the frontal plate is imagined a horizontal plane and a vertical plane in a sagittal position. Through the ink spot corresponding to the measures on the bitemporal plate is imagined a vertical plane in a frontal position.

Foreign bodies near the antero-posterior axis of the eyeball situated up to 20 mm. behind the connecting line between the two leaden buttons must be supposed to be intra-ocular when the eye is emmetropic. If the foreign body is 24 mm. or more behind the connecting lines, the splinter has pierced the posterior wall of the eyeball.

By a more eccentric position of the foreign body, the corresponding distances will be shorter. In some degrees of hypermetropia and of myopia, the corresponding distances will be 1 mm. shorter or longer for each 3 D. of ametropia.

If the refraction of the injured eye is not known (which is the rule), we must consider the refraction of the other eye, remembering, in doing so, that anisometropia amounting to more than 3 D. is rare.

Immediately before the operation, the surgeon ought to inspect carefully the metal globe (Fig. 5) with the two ink spots. He will then obtain a very exact notion of the position of the foreign body in the injured eye.

L. Webster Fox, of Philadelphia[3 and 13], like myself, takes an occipito-frontal plate besides the two bitemporal ones, but does not take care to secure the same horizontal direction of sight during the exposure for the former as for the two latter. For the bitemporal exposure the patient is placed on a table with his head fixed by sandbags and with the eyes looking horizontally. For occipito-frontal exposure Fox[13] makes the following arrangement (*l.c.* p. 512).—"The patient is turned face downward upon the table with his forehead and his nose resting upon the plate. The head is immobilised as before. The patient is asked to keep the eyes closed and not to move them."

It may be difficult enough to keep the eyes immovable when we have a definite object to fix.* When the eyelids are closed, it is, I think, impossible to keep the same horizontal fixation as during the bitemporal exposure.

For localisation Webster Fox uses a prothesis of metal wire (0·75 mm.) in the conjunctival sac of the injured eye. I cannot think that this prothesis, which may probably be of different sizes and forms, can fit so well to fixed points on the surface of the eyeball, as my two leaden buttons do; nor may it be able to accompany the eyeball so exactly during fixation upwards and downwards as my lead buttons, when I use the Grossmann method (Fig. 16 and Fig. 17). The wire prothesis must probably be removed immediately after the cessation of the cocain anæsthesia; my leaden buttons can be in place for hours without damaging the eye. The patient generally does not notice them, because they are lodged in the limbus furrow and because the silk thread lies in a furrow on the slightly convex surface of the button. My first localisation mark was a ring (11 mm. by 12 mm.) of thin, planoconvex metal wire fixed to the limbus with two silk sutures; but as it was not so well borne as the leaden buttons, it had to be sooner removed.

My method is used by colleagues in Norway, as well as by many surgeons in other countries. Among the several proceedings for X-ray localisation in eye and orbit my method is the only one described by Raymond Béal, of Paris, in his book, "*Les corps étrangers magnétiques intra-oculaires et leur extraction.*" He says that the method is "very simple, easy to perform,† and of great precision"

The removal of foreign bodies from the vitreous is one of the most delicate tasks in eye surgery. We distinguish between magnetical and non-magnetical splinters.

A. *Iron and Steel Splinters.*—I know that some surgeons are of opinion that localisation is of no consequence in the case of iron splinters, inasmuch as the giant electro-magnet is available. They believe that the diagnosis, as well as the extraction, can be performed with this instrument. I think, on the contrary, that the diagnosis of a magnetic or non-magnetic foreign body always ought to be made beforehand by the sideroscope, which also gives some notion of its position. But X-ray localisation, combined with the use of my leaden buttons, is without comparison, more exact. In one case I cut directly upon an iron splinter (weight 4 milligrams) situated in the ciliary body, where many attempts with a giant electro-magnet had failed. The eye retained V.=5/6.

When the size and position of the iron splinter are exactly known, the surgeon can make his choice of a portable magnet or a giant magnet beforehand. In the latter case he can choose between extraction from the anterior chamber *via* the zonula, in certain cases of small splinters, and between extraction through a meridional incision in the sclera, which is the better method when the splinters are larger. Mellinger's ring-magnet‡ may be regarded as a giant-magnet in the surgeon's hand.

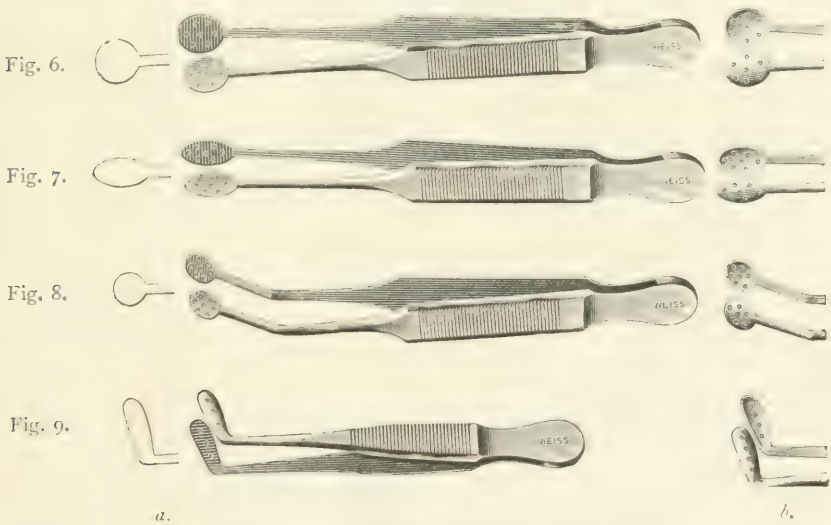
* You may try to fix a black spot in the centre of an orange-coloured square on white background, while the head is kept steady by biting a wooden spatula covered with dentist's wax; notwithstanding all effort you will after five seconds see that the fixation is trembling by observing a blue after-image on the white background near the margins of the square in one or another direction. When you close your eyes, trying to keep them immovable, you will soon feel, softly touching your eyelids with your fingers, that the eyeballs make great involuntary excursions.

† I must, however, warn surgeons against attempting the method without the head-fixing apparatus and the iron stand for horizontal fixation (Figs. 3 and 4). Neither ought the metal globe (Fig. 5) for localisation to be omitted.

‡ For an account of the Ring-Magnet see THE OPHTHALMOSCOPE, Vol. VII, 1909, p. 325.

B. *Non-Magnetical Foreign Bodies.*—These are most frequently represented by copper and brass splinters. Sometimes, small leaden bullets and small fragments of stone and glass are very difficult to see in X-ray photographs taken through the skull.

In these cases as exact a localisation as possible is, of course, indispensable. After snipping the conjunctiva in that anterior quadrant of the eyeball which affords the shortest way to the foreign body, I make a meridional incision, 6 mm. long, with the keratome through the exposed sclera into the vitreous. The anterior end of the incision is generally 10 mm. from the limbus ; the posterior end is prolonged with straight scissors 3 mm. or 5 mm. backwards. After a glance at the metal globe with the two ink spots (Fig. 5), I introduce one of the four pairs of forceps (Figs. 6, 7, 8, or 9) closed through the incision towards the supposed place of the foreign body, before opening the forceps, generally in a meridional direction corresponding to the axis of the incision, since by this means any escape of the vitreous is more easily avoided. It may, however, sometimes be more advantageous to open the forceps transversely to the axis of the incision. In these cases it is useful to make an assistant carefully keep the wound lips from each other with two fine pointed hooks (best made of German silver, because they may also be useful for certain cases of extraction with the magnet).



Figs. 6-9.—Spade-shaped forceps for extraction of non-magnetic foreign bodies from the vitreous. Each of them is made in 2 models :
(*a*) with plane blades, transversally ridged on the inside ;
(*b*) with the blades slightly concave on the inside and smooth.
In the blades of each model there are several small holes of 0.5 mm. diameter.

The models with the plane ridged blades (*a*) are generally suitable for small foreign bodies, and are the best to grasp the bodies lying against or partially fixed to the fundus. The models with concave blades (*b*) are, as a rule, better for larger foreign bodies, and are least hurtful when foreign bodies near the fundus are to be removed. The models in Figs. 6 and 7 are best for foreign bodies in the posterior two-thirds of the vitreous ; Fig. 6 is best for those near the antero-posterior axis, also when they touch the fundus near the posterior pole. The model shown in Fig. 7 is better for more peripheral foreign bodies. The models of Fig. 8 are for foreign bodies in the

anterior one-third of the vitreous, also for those near the lens and the ciliary processes. The forceps shown by Fig. 9 are for foreign bodies near the incision in one of the anterior quadrants.

In this way I have repeatedly, with the first grasp of the forceps, extracted fragments of copper or brass without any escape of vitreous.

More or less vision can be preserved, provided the operation is performed as soon as possible after the injury. The patient may then even escape with normal or nearly normal sight. In a case, where the patient did not come under my treatment until three months after the injury, the copper splinter was embedded in greenish matter (abscess in the vitreous coloured by copper salts). Here the vision became only 5/36, and the visual field remained somewhat contracted, although there was no detachment of the retina.

Some X-ray photographs taken after my method in cases of *intraocular* foreign bodies situated near the anterior or the posterior limits of the vitreous may now be shown. They are, in my opinion, better fit to show the anatomical exactness of my method of localisation than those from cases of foreign bodies in the middle of the vitreous. Finally, I will show some photographs from a case of *extraocular* foreign body lodged near the posterior wall of the eyeball. The negative plate for Fig. 10b was faint, although distinct enough for localisation ; but for the sake of the reproduction, a positive retouch on the copy of the shadows of the leaden marks and those of the foreign bodies was necessary. None of the other pictures was retouched.

The first case (Fig. 10) was in a boy of eleven with a copper splinter lodged in a ciliary process in the right eye on the nasal side and a little upwards (in the meridian 15°, according to the notation of the International Ophthalmological Congress of Naples).

The second case (Fig. 11) was in a girl of fifteen with a brass splinter in the lens of the right eye near the posterior pole.

In the third case (Figs. 12 and 13) the iron splinter could be seen with the ophthalmoscope in the fundus of the left emmetropic eye (Karl N., 22 years), in the horizontal meridian through the optic disc near its nasal margin. When figures 12 and 13 are compared you will find that my X-ray localisation agrees completely with the ophthalmoscopical examination.

In the fourth case, in consequence of a cartridge explosion, two copper splinters had pierced the right eye of Alf. O., aged 21 years. The refraction could not be fixed ; the left eye had H. + 0·75 D. The upper splinter, by comparing the measures on the figures 14 and 15, must be supposed to be lodged in the orbit clear below the inferior level of the optic nerve and probably a few millimetres behind the posterior wall of the eyeball.

As for the lower copper splinter, the intraocular or the orbital site might perhaps be doubtful, although the measure seemed to speak for the last alternative. For this reason I had another two bitemporal plates taken besides the one copied in Fig. 14, *viz.*, one with the eyes looking upward (Fig. 16) and another with the eyes looking downward (Fig. 17) after the Grossmann method[2], where also my leaden buttons may be used with advantage. It appeared in these plates (Fig. 16 and Fig. 17), that not only the lower but also the upper copper splinter moved in a direction opposite to that of the leaden buttons.

Four weeks after the accident, it became necessary to enucleate the eyeball on account of irido-cyclitis. The antero-posterior diameter was 24 mm. Both copper splinters had pierced the posterior wall of the eyeball. The lower copper splinter was lodged in Tenon's capsule and the upper one in the orbital tissue, close below the anterior end of the optic nerve.

Consequently, *the mobility of a foreign body together with the eyeball*,

ON X-RAY LOCALISATION OF OCULAR FOREIGN BODIES AND THEIR EXTRACTION FROM THE VITREOUS.

BY

DR. S. HOLTH.

Fig. 10.—Bitemporal (*a*) and occipitofrontal (*b*) photograph in half size from the right eye of Olav N., 11 years old; copper splinter lodged in a ciliary process on the nasal side and a little upwards (meridian 15°). The shadow between the superior and inferior rows of teeth is owing to the gauze-covered metal spatula on which the patient is biting. The shadow under the lower jaw is owing to the chin support of wood and metal.

Fig. 11.—Bitemporal (*a*) and occipitofrontal (*b*) photograph, half size, from the right eye of Inger M., 15 years old. The foreign body is a brass splinter in the posterior part of the lens, 3 mm. on the nasal side from the posterior pole of the lens (meridian 10° International Congress notation).

To face page 550

Fig. 12. Iron splinter near the nasal margin of the optic disc (L.E.). Man, 22 years. Occipito-frontal exposure.

Fig. 13. The same as in Fig. 12. Bi-temporal exposure.

Fig. 14. Two copper splinters in the right orbit of Alf. O., 21 years, with the right eye probably emmetropic. Bi-temporal exposure.

Fig. 15. The same case as in Fig. 14; occipito-frontal exposure (*right* eye: notice the *oblique* position of the plate – here against the right side of the nose. To compare with Fig. 3. The dark shadow above is due to the feather forceps of my apparatus, in which the plate hinges. The Crookes' tube has here unfortunately been placed a little higher than in the bi-temporal exposure (Figs. 14, 16, and 17). In the original plate and prints the two frontal sinus and their septum can be seen very well, though the rays here have passed the brain, because of the Crookes' tube having been placed too high.

Fig. 16.

Fig. 17.

Fig. 16 and Fig. 17. The same case as in Fig. 14 and in Fig. 15. R. E. Bitemporal exposure. The eyes looking upward (Fig. 16) and downward (Fig. 17). N.B. 24 hours after the injury.

shown on the X-ray photographs, does not prove its intraocular site, which I have already demonstrated in my first papers (6, Taf. XXIV. Fig. 3 or 11, p. 405). Direct measure of the distances between the shadow of the foreign body and those of the lead buttons, under careful consideration of the probable refraction of the injured eye, is a much surer proceeding.

My leaden buttons (Figs. 1 and 2) and my localisation globe (Fig. 5), as well as the different extraction forceps (Figs. 6, 7, 8, and 9), should be in the possession of every oculist. They are to be obtained from Messrs. John Weiss & Son, Ltd., 287, Oxford Street, London, W., or from Mr. M. Gallus, Pilestrædet, 7, Christiania, Norway.

The ophthalmic surgeon sends the patient to the X-ray specialist with the two lead marks fixed in the limbus (Fig. 2). The latter should be in possession of my head-fixing apparatus (Figs. 3 and 4) and the iron stand with the object for horizontal fixation (see Figs. 3 and 4). These appliances are made by Mr. E. B. Meyrowitz, 1A, Old Bond Street, London, as also by the original manufacturer, N. Jacobsens Elektriske Værksted, Pilestrædet, 25, Christiania, Norway.

After taking two or more temporal plates and one or more occipito-frontal plates, the X-ray specialist sends the patient back to the surgeon, who then removes the leaden buttons.

The surgeon himself takes the measurements on the plates and also carries out the localisation with the help of the ink spots on the metal globe (Fig. 5). A stereoscopic examination of the two bitemporal plates may sometimes be necessary. It is my opinion that a modern eye hospital should be equipped with complete X-ray rooms with instantaneous and localising apparatus, and that the assistants in the clinic should be taught to take the photographs themselves.

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CAN SYMPATHETIC OPHTHALMIA FOLLOW A NON-PERFORATING TRAUMATISM OF THE EYE?

BY

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THE reply of nearly all ophthalmologists to this question would be an unhesitating "No," and, as far as our present knowledge goes, it is probably the correct answer if we except those cases which have been recorded as following tumours within the globe. The question is, however, one of importance and merits full investigation. As long as we accept the axiom that sympathetic ophthalmia never results from any injury to the eye which does not perforate the globe, we are able to preserve many eyes which we should otherwise enucleate.

The following case illustrates the point:

A countryman, aged 60 years, came to the Coventry and Warwickshire Hospital with an inflamed eye which had followed a blow which he received from a branch of a tree when hedging. The patient was positive that he was struck by a large branch and not by a thorn; his medical man answered me that there had never been any sign of a perforation or even of an abrasion of the cornea. The accident had happened fourteen days before I saw the case. I found a severe iridocyclitis. There was intense ciliary injection; the cornea was covered with "mutton fat" precipitates; and the pupil was closed by a plastic exudate. There was a large hypopyon. The iris had lost its sheen and was œdematous. Tension subnormal. V. = light perception. The eye was tender and painful. The whole condition suggested that form of plastic iridocyclitis which in the presence of a perforating wound, would be very likely to excite sympathetic ophthalmitis. There was, however, no sign or history of such a wound. The eye did not yield to treatment and eventually excision was suggested but not pressed. The patient preferred to keep his eye because I was able to assure him that it did not endanger its fellow. At the present date, some two years after the accident, no sympathetic ophthalmitis has supervened.

The question can be asked in another form: can that special form of inflammation which characterises sympathetic iridocyclitis both in the exciting and the sympathising eye be caused by an *endogenous* infection, or is it always the result of an *ectogenous* infection?

Fuchs[1], whose paper has been most ably summarised by Hamilton[2], has shown that the inflammation is always of a special character. The inflammation is not the ordinary round-celled infiltration. Those cells are represented by lymphocytes—small, mono-nuclear, round cells. These cells occur isolated or in nodes which can be seen with a low power, the so-called "patchy infiltration." They appear first in the region of the vessels. They increase in size and surround the vessels. Nodules coalesce and the inflammation becomes "diffuse." Epithelioid cells are a constant feature; they are derived from the normal cells of the uveal stroma, from the endothelium of the vessels, and from the retinal pigment of the uvea. Giant cells are frequent, but not invariable. They are derived from epithelioid cells. Mast cells occur, but not in large numbers. Polynuclear leucocytes are rare. Russell's corpuscles are very frequent. Hamilton adds that plasma cells, which are differentiated by Pappenheim's stain, form a marked if not an essential feature. The inflammation is most pronounced in the choroid, which is never exempt. The infiltration in the iris is insignificant and it may almost escape any inflammation. The ciliary body is always affected, but sometimes to a slight extent. Again, the resolution of the inflammation is quite different from that of ordinary inflammation. There is no suppuration or caseation, but the infiltration organises in such a way that the uvea is transformed into a dense fibrous

membrane. The whole picture is so typical that Fuchs was able to go to a cabinet of slides and pick out unhesitatingly all the cases of sympathetic ophthalmitis. It is therefore quite certain that the process is one *sui generis*.

Now this type of inflammation has been found associated with cases of intra-ocular tumour, where there was no perforation of the globe, and one would therefore expect that sympathetic ophthalmitis would be excited by this disease. This has, in fact, proved to be the case. Meller[3] has studied these rare cases of intra-ocular sarcoma associated with sympathetic ophthalmitis and with Fuchs' inflammation. He points out that Th. Leber and Krahnstover in 1892 collected thirty-two cases of phthisis bulbi, the result of past sarcoma of the choroid; no less than five of them suffered from an inflammation of the other eye, which in the light of present knowledge, must be regarded as sympathetic in character.

If these facts be accepted they lead to the logical conclusion that Fuchs' inflammation is not always ectogenous in origin: the exciting factor may be endogenous. Meller says, "The possibility of endogenous infection of an eye which has sustained a traumatism, and has thereby been more or less altered, cannot be dismissed in an off-hand manner." He notes that Fuchs was surprised to find that the anatomical picture of sympathetic inflammation was absent in 171 eyes of 200 which had been excised on account of the danger of sympathetic ophthalmia. He was astonished that the "specific" inflammation was not more frequently met with without sympathetic ophthalmitis. The latter often only appears years after the accident. If one supposes that ectogenous infection takes place at the time the wound is received, then one would expect that a chronic state of Fuchs' inflammation would be present all the time, and that it would be discovered, no matter when the eye was excised, before the outbreak of sympathetic iritis. As a matter of fact, this is not the case. This is noteworthy, and lends no support to the theory of ectogenous infection. The occurrence of Fuchs' specific inflammation in cases of intra-ocular tumour without perforation speaks volumes against it. Meller, while not denying that ectogenous infection may take place through a perforating wound, regards this method as exceptional.

If we allow that endogenous infection can take place without a perforating wound, the way is at once open to admit cases of sympathetic ophthalmia without a wound and apart from tumour formation. Do they occur? Apparently not. A careful search through the literature at my disposal has failed to reveal a single recorded case. The authorities are very emphatic on the subject. Thus, Fuchs[4] says "sympathetic ophthalmia follows an iridocyclitis of the exciting eye, which almost without exception has suffered from a perforating wound."

Hertel[5] states that the disease is found only after a perforation of the exciting eye. And other text-books speak in the same strain.

Sympathetic ophthalmia occasionally follows a corneal ulcer, but only when there has been some operation upon the ulcer or prolapsed iris, such as a cauterisation or a Guthrie-Saemisch section.

Trousseau[6] cites cases of sympathetic ophthalmitis following cauterisation of a prolapsed iris.

Thomson[7] reports two cases of sympathetic ophthalmitis of this nature. In the first an old man had a conjunctivitis which was regarded as an example of Parinaud's disease. The cornea necrosed, and four months later, a low-grade iritis started in the second eye. The exciting eye was excised and the sympathising eye made a good recovery. Unfortunately, we are not told whether the characteristic Fuchs' inflammation was found.

The second case was one in which sympathetic ophthalmitis followed a Guthrie-Saemisch section for hypopyon ulcer.

My own experience[8] confirms the view that perforation of an ulcer followed by adherent leucoma does not cause sympathetic ophthalmitis unless an operation has taken place. More than 20 per cent. of all the cases of mucopurulent ophthalmia which are treated at the British Ophthalmic Hospital in Jerusalem, which in the period 1900-1905 numbered 5,701, are complicated with corneal ulcers. Half of these either arrive perforated or perforate during treatment.

The following example is the only one in which sympathetic ophthalmitis was observed, and, like the cases recorded by Thomson, the eye recovered. Apparently, the transferred disease is mild in these cases.

Hospital case 71,166. **Ibrahim**, an Arab, age 16, came to the British Ophthalmic Hospital on May 20th, 1903, with a large prolapse of the iris through a small perforation of an ulcer of the left cornea. This has been present for five weeks. There is an adherent leucoma in the same eye. The prolapse was separated from the cornea and cut off under cocaine. The eye made a rapid recovery, the cornea became normal in shape, and a firm healthy scar formed. On the 27th the result is noted as excellent. T.n. *Jan. 8th*, 1904, came up with a slight sympathetic iritis of the other eye, the right. There is no pain, the pupil does not react, the iris is œdematous, and its pupillary edge is irregular. Dilates very slightly and irregularly. V.R. = fingers at one foot. V.L. = hand reflex. The right fundus cannot be seen, and the red reflex is very faint. Put on atropine drops in each eye. *Jan. 11th* —The left eye has lost its circumcorneal injection. T still plus. The iris cannot dilate, as it is bound down at opposite poles by the two adherant leucomata. The right pupil is slightly and irregularly dilated. *Jan. 13th.*—Under the influence of atropine the left tension has become normal. V.L. = figures at one foot. *Feb. 5th.*—Has not attended, nor has he used his atropine. Has much pain in left eye, with T+1. V.R. = fingers at 2 metres. V.L. = fingers at half a metre. The right vision has improved. *Feb. 8th.*—T.n. again after operation. *Admitted* for iridectomy on the left eye. *Feb. 11th.*—Iridectomy attempted but found to be technically impossible as the iris was everywhere adherent and was very friable. *Feb. 15th* discharged himself. *March 3rd.*—Has not attended. Has been treated by some "witches" at Bethlehem, R.T.n. and T.L.+1/2. *March 9th* —Under atropine again. T.n. in each. V.R. = fingers at 1 metre. V.L. = 6/30. *April 22nd.*—V.R. = fingers at a foot, there is now a pupillary membrane. V.L. = 6/60. It was difficult to see exactly what was the condition of the sympathising eye, as there was an old central non-adherent leucoma. There can be no doubt that the case was one of transferred iritis, for idiopathic iritis is almost unknown in Jerusalem. I remember seeing only one or two examples among some 7,000 cases. This is the sole and only case of sympathetic ophthalmia caused by a perforated ulcer which ever came under my notice. and Mr. Cant told me he had seen none in his extensive experience of over twenty years.

Stieren[9] finds that sympathetic ophthalmia is associated with corneal ulcers, which are complicated with extensive anterior synechiæ and plastic uveitis with osseous degeneration, and in those cases in which uveitis has ended in phthisis bulbi.

We must now pass on to a remarkable case which may or may not be a case of severe sympathetic ophthalmia following a non-perforating traumatism, a contusion, of the other eye.

G. L., female, aged 25 years, residing at Saskatchewan, came over to England to see whether anything could be done for her eye. She saw Mr. Nimmo Walker at Liverpool, then Mr. Priestley Smith, at Birmingham, and, finally, came to see me at the Coventry Hospital. Both Mr. Priestley Smith and Mr. Nimmo Walker have favoured me with their views of the case, which fact renders it the more valuable.

The history is that thirteen years ago she received a blow upon her right temple, where there is now a scar. The eye became inflamed, and sight was gradually lost. Eleven months later the left eye became inflamed and she became totally blind. She was always short-sighted.

P. C.—There is no perception of light in either eye. The right iris is atrophic and the pupil partly dilated. The lens is partially dislocated, and has a chalky cataract. There are extensive posterior synechiæ. T—1. The left iris is *bombé*, and there is complete seclusio and occlusio pupillæ. The iris is atrophic. T—1.5.

There has been no treatment.

Mr. Priestley Smith writes:—"I was suspicious of sympathy, but do not think there is much ground for that diagnosis. She said she was 'very short-sighted when her sight was good.' I suspect original high myopia in both; detachment of retina; iritis later, as usually happens. Same process

in left eye, though without history of injury. This seems to me the more likely diagnosis.

"*Notes of case.*—R.V.=O ; post-synechiæ, secondary cataract. T.n. Blinded by blow on temple 13 years ago—? detachment of retina. L.V.=O ; post. synechiæ T.—2 ; looks like sympathetic ; began with floating specks—? detachment of retina. Was very short-sighted when her eyes were good. No treatment."

Mr. Nimmo Walker writes:—"I have been trying to find out what is 'sympathetic' inflammation, but unsuccessfully. Even if Fuchs is right in claiming that it is a specific type of inflammation recognisable microscopically, yet cases have been described showing similar microscopic changes where the cause cannot be sympathetic, as the other eye is normal.[10]

"In Mrs. L.'s case there is no doubt that the condition is due to a chronic irido-cyclitis, but can it be said to be a case of sympathetic ophthalmitis? The difficulty to me lies in the term, 'sympathetic' ophthalmitis. Is there a sympathetic inflammation which can arise in an eye only as the result of a wound of the dangerous zone in the other eye? I am inclined to think not, as I cannot distinguish it from an 'idiopathic' plastic irido-cyclitis which may be present, as in a case which I saw recently, a typical picture of sympathetic ophthalmitis, irido-cyclitis, K.P., total occlusion of pupil, secondary cataract, and shrinking of globe—the only thing lacking to complete the diagnosis of sympathetic ophthalmitis being the one thing essential—an injury to the other eye. The hypothesis which appeals to me is that this form of irido-cyclitis is due to specific micro-organisms, of which the toxins (cf. tetanotoxin and the central nervous system), have a special affinity for the uveal tract. Gaining admittance to the body through some lesion, usually by direct inoculation into the ciliary region of the other eye, where of course they are under the most favourable conditions and therefore are most dangerous, but possibly also through any lesion in the body, especially in the alimentary tract, teeth, tonsils, etc., the micro-organisms, or their toxins, are carried to the seat of their special activity, the uveal tract of the 'sympathising' eye.

"In Mrs. L.'s case the eyes were myopic ; a blow on the right temple caused trauma, possibly detachment of the retina, and gave the micro-organisms their opportunity, exactly as a slight injury to a joint precipitates tuberculosis. The right eye having become a manufactory for the supply of these organisms, in the course of time, 13 months, the left eye became attacked, and in this way was the subject of 'sympathetic inflammation.'"

Personally, I feel inclined to think that the case was one of sympathetic ophthalmia. There is no evidence that the retina became detached. The trauma was rapidly followed by inflammation. The right lens appeared to me to be partially dislocated, and this may have been the primary injury to the eye. Rouse[11] points out that subluxation of the lens may give rise to sympathetic irritation. In this case we have a subluxated lens in one eye, in the other a condition which Mr. Priestley Smith admits to be suggestive of the final result of sympathetic ophthalmia, and which to me is quite typical of that condition. All that can be said is that it is impossible either to disprove or to prove that the case was one of sympathetic ophthalmitis. Mr. Nimmo Walker's communication paves the way for the important question: *Are we justified in retaining an eye which has become blind from a plastic uveitis following a non-perforating injury, and which may be chronically injected, tender, and soft, or may be in a condition of complete phthisis bulbi?* I venture to think that in doing so we are running a certain degree of risk, and that it is safer to remove such eyes.

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Since I wrote this paper Mr. Jameson Evans has told me that he has seen a case of sympathetic ophthalmia which followed a sub-conjunctival dislocation of the lens of the exciting eye.—T. H. B.

ORBITAL SKIAGRAPHY—WITH REFERENCE TO ITS LIMITATIONS AND TECHNIQUE.

BY

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THE use of radiography in ophthalmic work is rapidly advancing into importance, more especially in two conditions, namely, in rodent ulcer—a therapeutic use it is not proposed to deal with in this article—and in the determination of the presence of foreign bodies in the eye or the orbit.

Limitations.

Perhaps it were as well to deal with the numerous limitations of orbital skiagraphy before referring to *technique*. Speaking generally, it is only substances that are skiagraphic (shadow producing) that it is any use attempting to define. Not that there are not many substances that enter the eye or orbit, which, were they in suffiient bulk, would produce faint shadows,—such as wood, stone, flint, china, glass (lead), and such like. These would all throw very faint shadows were their bulk and thickness sufficient, but in the vast proportion of suspected cases of foreign bodies in the eye, it is with a very small fragment that one has to deal. Shadows are produced by the relative penetrability of the substances exposed: soft tissues throw a very faint shadow in a properly exposed plate, bone a firm shadow, and metals a distinct shadow; and it is well to bear this in mind, for there is no use spending time in attempting to localise such substances as are non-filters to X-rays. It is not maintained that no shadow at all can be obtained, but that no shadow of any diagnostic value is produced, for such shadow, if produced at all, is so masked by the overlapping shadows of the malar and other bones as to be of no real use to the surgeon. Probably in no part of the body is the rendering of the true value of the relative position of parts more difficult than in dealing with the eye and orbit, because of this very overlapping of parts, for

in the nature of things, the radiograph must be taken through the head laterally, and, try as one will, one cannot avoid the perplexity produced by them. Most other radiographs can be taken in such a way as to avoid two or more bones overlapping, especially so at the very spot where one knows or suspects a foreign body to be lying, or, if so taken, the skiagraphs of such bones are distinctive. Indeed, it is only after looking constantly and daily at orbital radiographs that one can give a true rendering of things.

To sum up the limitations then.—Any substance that is a filter to X-rays will be shown as a shadow on the plate,—brass, steel, iron, metals of of all kinds, but for all *practical* purposes it is only metals that will show any useful or diagnostic results. Any substance that is not a filter to X-rays will show no shadow, *i.e.* wood, glass, china, and such like—always with the proviso that such fragments are not in very gross bulk. For instance, a block of wood, perhaps half inch thick, would show a shadow, but then the injury so produced would be so great that the radiologist's services would not be required to determine the position. That which one would fain desire to find and localise, *e.g.* a small splinter of wood, would not show any shadow sufficiently certain to be of any use at all. A piece of lead-pencil, however, is quite distinctive, the wood throwing no shadow, while the lead (graphite) is as dense as a piece of metal. This is a foreign body that, while it would be obvious visually if it were lying in the eye, would not be so if it were in the orbit.

Technique.

With regard to the electrical apparatus itself little need be said: a twelve inch or fourteen inch coil is amply sufficient, and almost any tube will give results—varying, of course, in the hands of different operators. What is important is the milliamperage passing through the tube and the time exposure. Extensive and carefully graduated experiments have been made with all sorts of varying combinations, soft tubes and short exposures—hard tubes and long exposures, and so far as my personal experience goes, I would say that an exposure of about three minutes with ·5 to ·6 m.a. of current gives the best result, but every operator must find out the best exposure for his own apparatus and the sort of plate that he uses. Besides, the penetrability of patients' crania varies greatly, so that what gives a good result with one case may not do so five minutes afterwards in another case; the tube, exposure, and the milliamperage all remaining the same in the two cases.

The distances between the anticathode and the plate is another point upon which opinions differ. Personally, I find that the nearer one gets to the patient's face with one's tube, *i.e.*, the nearer to the foreign body and to the plate, the better the results. The tube can be approached as nearly as two inches and a half to the cheek—in other words, leaving only a distance of some nine inches between the plate and the anticathode. No dermatitis will be produced by this very close application, providing that one does not use more than ·5 to ·9 m.a. through the tube, and makes only one exposure of three minutes at a time. This may seem very close work to some operators, but so far for the last two years I have seen no case of dermatitis, or even of irritation, produced by such proximity. It is advisable to use as small a diaphragm as possible, for by this means the results are greatly sharpened.

How to fix the plate in a good position beyond, and next to, the injured eye was a difficulty, There are several appliances for this upon the market. but they are all more or less bulky and cumbersome. The most easily worked plate-holder was made out of an ordinary half-plate printing frame, with brass runners on all four sides, which is firmly held to the head by means of elastic

straps, sliding in those runners. Of course, this form of holder is of no use for stereoscopic work, as it allows of too much movement of the patient's head. For such work one requires some such apparatus as Mackenzie-Davidson's.

To get the plane of least overlapping of shadows is to get the best photograph and I find that it is best to advance the centre of the anticathode about half inch or three-quarter inch in front of the malar of the uninjured side, so that, as it were, the rays are somewhat looking *into* the orbit. This prevents the shadow of the near malar overlapping the shadow of the distant one, *i.e.*, the malar of the injured side. Lengthened and accurately measured experiments were made and have forced me to use this position invariably, although I am aware that there are objections. There are two main objections, first, that the shadow of the foreign body is thereby projected further posteriorly than is actually the case ; and secondly, theoretically the correct position for the relative position of plate to anticathode is that the former shall be at right angles to the central ray of the anticathode. The normal coneshape of the head makes it impossible to carry this out, unless one goes about two inches behind the malar of the uninjured side, which, as already explained, is the worst position for overlapping shadows of bones. The further forward one takes the anticathode, the more slantingly do the rays meet the plate, and it is granted that it is an objection. But both of these difficulties must be overcome by the radiographer himself, allowing for them in his mind when translating the negative itself, and if one always takes the negative from the same position, the results are nearly all homogeneous.

To be certain that the relative position of plate to anticathode is correct, one should look through the back of the tube through the diaphragm, and the operator should be able to look somewhat into the uninjured eye. It is an advantage to have the tube as near the plate as possible, because the further away one goes, the less does the distance become between the two shadows on the superimposed plates, while the nearer one gets to the plate, the greater that distance becomes. A little consideration will prove this to be the case.

The patient can be sitting by this method, avoiding the expense of a special table, although it is necessary, very necessary, to fix the patient's head in an ordinary photographer's head-clip. This precaution prevents the constant tiny movement on the part of the patient's head.

Another difficulty was the tendency of the patient to allow his eyes to move, although his head remained still—this, if the foreign body is in the eyeball itself, results in a number of foreign bodies. It can easily be overcome by telling him to look fixedly at some bright spot.

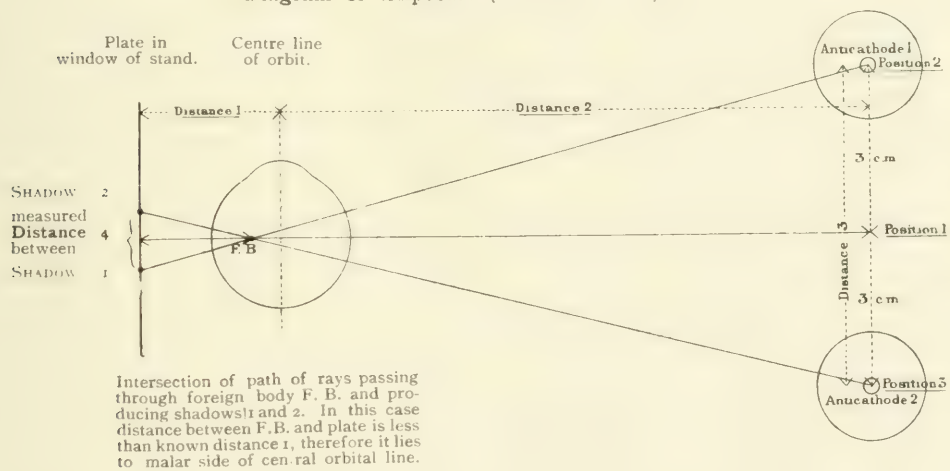
This fact of a seeming dual or treble foreign body, when only one is present, can be used as a very useful diagnostic to say whether the foreign body is actually in the eye or is lying free in orbit. Take the first $1\frac{1}{2}$ min. of the exposure with eye looking fully upwards, and the second $1\frac{1}{2}$ min. with the eye looking fully downwards ; if the developed plate shows two foreign bodies, it is in the eye, if there is only one, then it is in the orbit,—with this exception that if the foreign body is in one of the ocular muscles or in the sheath it will have moved, although but slightly, compared with the extreme elevation and depression of the eyeball. It is of very great use to employ plates that are already put up in envelopes, and so sold, because there is no difficulty in putting these into the carrier or into the window of the stand, as the case may be. Nearly all makers put up half-plates in this form.

Localisation.—Speaking broadly, there are two methods of localisation, one a simple procedure, the other more complex. Speaking for myself, I find that in nine cases out of ten, the simple method is sufficient for the surgeon's purpose.

The *complex localisation* takes a much longer time than the simple, necessitating two exposures, and is in the end a matter for careful calculation, being stereoscopic. The first essential in this method is that the relative position of the patient's head to the plate shall be absolutely the same in both exposures, and that only the tube shall be capable of being moved. The well-known Mackenzie-Davidson apparatus serves all these purposes very well, although the apparatus is in itself rather cumbersome.

The patient's head is fixed next an opening in a frame that can be stood upon the table, so arranged that a plate can be inserted from the distal side of the window; hence the two plates bear relatively the same position to the head and foreign body in all photographs taken. In taking this kind of double skiagram it is necessary first to place the anticathode exactly opposite the malar of the uninjured side, (differing from the position explained in the previous case), and to see that the centre rays would fall as nearly as possible at right angles on the plate (position 1).

Diagram of Exposure (seen from above).



Intersection of path of rays passing through foreign body F. B. and producing shadows 1 and 2. In this case distance between F.B. and plate is less than known distance 1, therefore it lies to malar side of central orbital line.

The anticathode must then be moved forward exactly 3 c.m. and the first exposure made, *i.e.*, from anticathode 1. (position 2). The anticathode is then moved backwards for 6 cm., *i.e.*, 3 cm. behind the mid-malar line (position 3), and another exposure made, upon a different plate of course, with exactly the same length of time and amount of current passing in the tube. Both plates should now be developed together, and carried through the entire further process together. On drying, the two plates are superimposed and the two shadows of the foreign body will be found not to be in the same position on the plates, although the rest of the two plates coincides perfectly. This lack of convergence must now be most accurately measured.

Certain measurements are to have been determined beforehand, as accurately as possible, *i.e.*—

1. Distance between centre of eye and the plate.
2. Distance between centre of eye and the anticathode.
3. Known distance (6 cm.) between the two positions of the anticathode.

Having, in all, three predetermined distances, and having himself found out the fourth, *viz.*, the distance between the two different shadows upon the superimposed plates, it is an easy matter for the operator to calculate the point of intersection of the two rays, anticathode 1 to plate A and anticathode 2 to plate B, that point corresponding to the actual position

of the foreign body. If the distance between the plate and that newly-found point is greater than the known distance between the plate and the centre of the eye, then it is obvious that the foreign body lies to the nasal side of the centre line, but if less than that distance, then the foreign body lies to the malar side of the centre line, diagnosis being given as so many mm. inside or outside the centre line of the orbit. To some who may not desire to work out the position trigonometrically, it may be said that the calculation can be more readily made graphically, working carefully to one-half or one-quarter scale, then multiplying by two or four as the case may be. Example—Distance 1 3 cm.

" 2 21 cm.

" 3 6 cm.

" 4 1 cm.

Work this out graphically and it will be found that the foreign body (= point of intersection of rays from anticathode 1 to plate A and of anticathode 2 to plate B), lies 5 mm. to the nasal side of the centre line of orbit.

A further useful point is that the two exposures may be made upon one plate, each exposure being shortened somewhat, and the distance between the shadows measured and calculated as before. This one-plate method has the advantage over the other, that the simple plate-holder can be used, only the patient's head must be fixed very firmly, so as to get similar results from the two exposures.

(2) By far the *simpler method* is to make but one exposure, working always from the same known relative position of anticathode to the eye and plate, and if the matter is left to the observer who is constantly viewing orbital negatives, he will but seldom be very far out in his verdict. It is as well for him to commence working for some time with fixed metal points, attached by means of sticking plaster, until he finds that he can discard the aids entirely. It is easier after a time to say approximately where the metal lies, in upper-inner posterior segment, or in lower-outer anterior segment, and so on. For, after all, I take it that that is what the surgeon wants to know, and not how many millimeters it is distant from the centre of the eye, for he has no means of measuring his millimeters internally, so as to be sure that he is at a certain spot.

Should the shadow be very sharply defined, it is invariably nearer the plate, *i.e.*, in one or other of the outer segments of the eye, if somewhat indistinct and hazy, then it is in the inner half of the eye.

With regard to foreign bodies within the orbit and not inside the eye, reliance may be placed on the method before indicated of taking two half exposures upon the same plate, with the eye in extreme elevation and depression alternately, the absence of a double shadow indicating that the body is in the orbit, although not in the eye.

The position of the shadow of the foreign body relatively to the surrounding bony shadows is nearly always sufficient to show where it lies, especially when the foreign body lies very far back in the orbit, say, in the periorbital fat. There is very little use in localising a foreign body in the orbit, because the wound of ingress is sufficient to say whether the foreign body is to the nasal or malar side of the eye, and then the shadow is so distinctive in its relation to the bony shadows that no mistake can be made.

THE OPERATION OF TREPHINING FOR GLAUCOMA, ITS HISTORY, ITS TECHNIQUE, ITS INDICATIONS, AND ITS RESULTS.*

BY

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VON GRAEFE'S operation for glaucoma held almost undisputed sway for half a century, although no one understood the mechanism of its action, and although all or nearly all admitted that it was only suited to a certain class of cases. Then Lagrange and Herbert established the value of sclerectomy and showed not merely that a filtering cicatrix was a possibility, but that it was the pivot point of successful operating for the relief of high tension in the eye. Those who have freely tried Lagrange's operation and Herbert's earlier method will probably agree that, whilst the broad principles established were of very great value, the methods advocated left much to be desired. Our objective was an operative measure which would combine safety, certainty, and facility—safety for the patient, certainty for the surgeon, and with these a facility of execution which would remove sclerectomy from the rank of difficult and hazardous operations. The idea that trephining of the sclera might satisfy these exacting conditions first presented itself to my mind as far back as the beginning of 1907, but it was not till August, 1909, that I summoned up courage to trephine an eye for glaucoma for the first time. When I did so, I was quite unaware that it had ever been done before, or I should have acted with less hesitation. On August 2nd, 1909, there were three glaucoma cases awaiting operation in the Government Ophthalmic Hospital, Madras. The first was trephined with much anxiety, but the procedure was so simple, smooth, and satisfactory that the other two eyes were also submitted to trephining that morning. Since that time we have trephined over 400 eyes in Madras, and the method has been demonstrated to a large number of surgeons from other parts of India and elsewhere. An opportunity has always been gladly offered to visiting surgeons of trying the operation for themselves on selected cases, and a number have availed themselves of it. One and all have expressed the opinion that the method is clean, neat, and easy in execution, and have stated their intention of performing the operation in their own practice when opportunity offered. Several have since done so. We have frequently been able to demonstrate to visitors the influence of the operation in maintaining a lowered tension, for one or other of our old cases frequently returns for inspection; such cases are very carefully examined and a full note is taken.

On the appearance of my first paper (THE OPHTHALMOSCOPE, Dec., 1909) based on 50 trephine operations, Dr. Freeland Fergus, of Glasgow, wrote (THE OPHTHALMOSCOPE, Feb., 1910) to point out that he had been trephining for glaucoma since Jan., 1909, and that an account of his method had appeared in the *British Medical Journal* of October 2nd, 1909. I at once waived all claim to priority, whilst clearly showing that my work had been quite independent of that of Dr. Freeland Fergus. In the same number of THE OPHTHALMOSCOPE Mr. Sydney Stephenson (whose energy and enterprise have placed ophthalmic surgeons so deeply in his debt) pointed out that in the use of the

* A communication read at the Oxford Ophthalmological Congress on July 13th, 1911.

trephine for glaucoma we had both of us been long anticipated by Argyll Robertson, Blanco, and Fröhlich. Those workers did not, however, appear to have persisted in the method or to have realized its great value. Between Fergus' method and my own, a very wide difference exists. He adds a cyclodialysis to his trephining, whilst the operation which I have endeavoured to introduce to the notice of the profession, is that of *simple* trephining. The motive is to reach, to tap, and sub-conjunctivally to drain the anterior chamber, with a minimum of injury to the structures of the eyeball. To this end the sclera is trephined as far forwards as possible, the ciliary body is avoided, the chamber is entered directly by the trephine, and the iris is dealt with only if it shows a tendency to block the trephine hole, and so to interfere with filtration. The cardinal rules are few and short, *viz.*: (1) to dissect the conjunctival flap as far forwards as possible; (2) to apply the trephine as far forwards as possible consistent with the avoidance of injury to the conjunctival flap; and (3) to use a sharp trephine.

We have throughout been steadily turning our attention towards the perfecting of the details of the operation, and although it would be absurd to claim that finality had been reached, we think that the main lines have been laid down. Careful reviews from time to time of our results have enabled us to settle, to our own satisfaction at least, many of what were at first vexed questions.

Preparation of the Patient.—A patient with acute or sub-acute glaucoma is admitted to hospital and given a free saline purge; four leeches are applied around the margin of the orbit; a solution of sulphate of eserine is freely instilled, and an opium sleeping draught is administered; fomentations are applied if there is severe pain. It has so far invariably been found that the tension, vascular congestion, and pain are greatly relieved by the following morning, and operation is then undertaken. Chronic cases are kept in hospital till the "glaucoma operation day" (Thursday), and treated on ordinary lines; the bowels are relieved; sleep is induced, if necessary; and the patient is got used to his surroundings; eserine in weak solution is freely instilled.

On the morning of operation the lids are everted by an assistant and are freely irrigated with a 1/3000 solution of perchloride of mercury for one or two minutes; a solution of cocaine hydrochlorate (4 per cent.) is next instilled four times, at two or three minutes' interval, and the patient comes on the table. The operator first expresses the contents of the Meibomian glands by firm digital pressure, and then proceeds to swab out the conjunctival sac by the aid of small cotton wool swabs mounted on sticks and carefully steam-sterilized beforehand. The swabbing out is done under a stream of sterilized normal saline solution (1.4 per cent. of sodium chloride), which is poured in from an aluminium tea-pot, designed for the purpose, and having a long, narrow spout. Every recess of the sac is gently but thoroughly cleansed, until all mucus is removed therefrom. This method of sterilizing the conjunctiva was described before the Ophthalmological Society of the United Kingdom on December 10th, 1908, as well as previously in various journals. Some idea of its value may be gained from the fact that in the course of the last two years of work in Madras, I have not had a single instance of suppuration after any intra-ocular operation performed either in hospital or in private practice; the operations in question include over 300 trephinings, about 1,000 cataract extractions, and many other minor procedures, such as iridectomies, iridotomies, etc. It is noteworthy that this banishment of suppuration has been effected in a land where panophthalmitis after operation is rife in the practice of those around us.

Anæsthetic Used.—It is only necessary to administer a general anæsthetic in the case of people who are devoid of all sense of self-control. In the great majority of cases reliance is placed entirely on the instillation of cocain solution (4 %) reinforced by one, or at the most two, instillations of adrenalin chloride solution (1/1000). If there is much pain and congestion, a sub-conjunctival injection is given of 3 or 4 minims of a mixture of equal parts of the above solutions, and a hypodermic injection of morphin is also administered about twenty minutes before the operation. The latter is also used when there is reason to fear that the patient will be unruly.

Steps of the Operation.—(1) *Formation of the Flap.* The patient lies facing a good light.

A large triangular flap of conjunctiva is dissected up from above the cornea. Our latest incision does not begin and end, as our earlier ones did, in the limbus; it runs roughly concentric with the corneal margin, and ends on either side about 4 mm. below the highest point of the cornea, and the same distance from the inner and outer sides of the limbus. We lay great stress on this detail, for even if the line of incision cicatrices down all round, filtering fluid from the interior of the eye can still find a free exit through the trephine hole into the sub-conjunctival space outside the limits of the incision through the waterways thus left. It is most essential that this flap should be dissected right up to the limbal attachment of the conjunctiva; to ensure this, it is reflected on to the cornea and the dissection is proceeded with until the rounded edge of the limbus can be seen overhanging the surrounding scleral tissue. Against the dark underlying cornea the appearance of this overhanging edge forcibly suggests a recollection of the corona of the glans penis; if this appearance is seen the surgeon is safe to enter the chamber. But in old, long-standing cases it cannot always be obtained, and these are precisely the cases in which there may be difficulty in entering the chamber on account of adhesions at the irido-corneal angle; we are then in danger of being confronted with a complicated operation and possibly with ultimate failure. It was the experience of such cases that led us to a further refinement of our procedure, which we have since adopted as a routine measure in all cases; and we now carry our separation of the conjunctiva from the cornea to a farther stage with the aid of the scissor points. As a result of this manœuvre, the cornea can be seen to be split; a thin, dark-coloured crescent, about one millimetre in breadth, surrounds the base of the flap, and defines the area over which the splitting has been effected. Once this appearance is recognised, we may be sure of entering the anterior chamber with the trephine; hence the importance of adopting this modification of our *technique* in every case of trephining. Throughout the whole of the dissection of the flap it is important to keep the points of the scissors directed *towards the plane of the posterior pole of the lens;* for if one dissects tangentially one is sure to button-hole the conjunctival flap. At the risk of repetition the writer would emphasize the absolute necessity of dissecting the conjunctival flap sufficiently far forward to ensure the trephine entering the chamber directly; this is the pivot-point of the whole procedure. The flap should not be pulled on, or it will become ragged; one can easily steady the globe by forceps pressure on the cornea through the down-turned flap; it is not at all necessary to attempt to keep the eyeball in place by seizing the flap in the teeth of the forceps, and it is most incorrect to do so. Before the trephine is applied to the sclera, the area selected for its application should be carefully cleaned of connective-tissue tags attached to the flap; this can be easily done by dissection with the scissors points. If the precaution is

neglected, the flap will be drawn into the instrument as it works and will be button-holed or otherwise seriously damaged. It is not necessary to lay bare the limbus throughout the length of our incision. It is sufficient if we do so at the centre of the latter over the area adjacent to the spot on which we propose to apply the trephine.

(2) *Application of the Trephine.*—The spot selected for trephining should be as close to the limbus as possible. If this cardinal rule is disobeyed, two dangers confront the operator: (1) he is much more likely to have an escape of vitreous; and (2) he will probably fail to enter the chamber with his trephine and will have to burrow his way into it by the aid of a curette or other instrument; in so doing he will probably injure the ciliary body. The writer is aware that Heine has advocated cyclodialysis, and that Freeland Fergus deliberately combines trephining with cyclodialysis. The essential feature of the operation now being described is that it is a *simple trephining*. The object before the operator is to enter, tap, and drain the anterior chamber with the *absolute minimum of disturbance to other structures;* a clean, neat hole through the sclera satisfies these conditions. The trephine is used with quick, light movements, and care is taken that its first application serves to make it bite into the sclera, before it is raised to see the progress made; once a clean ring is thus started, it is easy to replace the trephine in it again. In his early cases the surgeon feels the need of frequently removing the trephine to mark the progress made, but he soon learns to know when he is "through." There are several points to guide him as to this.—(1) Directly the chamber is tapped, aqueous wells up alongside the instrument and mingles in streaks with the surrounding blood; (2) there is a curious sucking sensation the moment the work of the trephine is done; and (3) the patient often indicates the completion of the section by a slight movement due to the pain (very bearable) inflicted at this moment. There is a likelihood that the surgeon will leave his disc of sclera attached at one point, and this is most often on the corneal side; a snip with a pair of sharp iridectomy scissors separates this attachment. If the trephine is very sharp even this is unnecessary, as the disc is cut out clean; it is advisable whilst trephining to lean a little on the corneal edge rather than on the opposite one. In this way we make sure of entering the chamber as far forwards as possible. I think it probable that in a large percentage of cases, some portion of the deepest layer of the sclera is left *in situ*, however clean the trephining may appear. We have lately been led to this conclusion in a rather curious manner.—A few trephinings were made in Madras with a von Hippel's clockwork instrument, and it was obvious that the instrument rapidly cut out a very clean disc in each case. An interesting observation followed, *viz.*, that iris-prolapse was a much more frequent complication in the after-course of these cases than it had before proved when the hand trephine was in use. It was suggested that the hand-used instrument probably left a portion of the deepest layer of the sclera *in situ*, and that this portion although separated round most of its edge had a trap-door attachment at one point. A close study of our latest trephine wounds at the time of operation has, I think, confirmed the correctness of this suggestion.

In Madras, we have used a number of trephines of the Bowman pattern but have derived most satisfaction from those made by Messrs. Weiss under Mr. Sydney Stephenson's instructions.* Messrs. Arnold & Sons have made a trephine for me, which I shall have the pleasure of showing this afternoon, and which embodies some improvements suggested by our latest experience.

*The Ophthalmoscope, Vol. VIII, 1910, p. 99.

The beginner finds some difficulty in keeping his trephine to one spot, and, indeed, one of our pupils at first seemed quite unable to do so ; even the expert finds a little difficulty if working with a very blunt trephine. Considerable assistance is obtained by seizing the trephine low down, close to the eye, in the grip of a pair of conjunctival forceps, and thus steadying the cutting edge of the instrument. Messrs. Arnold & Sons have at my suggestion devised a handle carrying a small collar to be supplied with the case of trephines ; the trephine would be pushed into the collar before applying it to the eye, and would work easily and smoothly therein. Dr. E. Maddox, of Bournemouth, has been using a similar device of his own invention and is well pleased with it.

The question of the best size of trephine is an important one. I think that anything above 2 mm. (in diameter) is too large. A study of our returned cases seems to show that a large aperture is unnecessary, and obviously the smaller the opening that suffices the better. The choice lies between a 1.5 mm. and a 2 mm. instrument, and our inclination leans latterly towards the larger size, for it is very difficult to work with any pattern of iris forceps in anything below a 2 mm. aperture ; and as it is absolutely necessary to do so when the iris tends to present in the trephine hole, this is a very serious matter. Lastly, the accident of losing the trephine disc in the anterior chamber is a rare one when working through a 2 mm. hole, and is relatively frequent if a smaller trephine is used. I do not believe that the loss of a disc in the chamber is a matter of any importance. If it occurs, the disc can be washed out with an irrigator, but, failing this, it may well be left alone.

Treatment of the Iris.—It sometimes happens that the iris bulges into the aperture the moment the disc is cut through ; if so, it is snipped with scissors in a radial direction in order to let the aqueous escape ; the membrane then often goes back of itself ; if it does not do so, then a piece is excised, care being taken to avoid traction on the iris, which will otherwise tend to become impacted in the narrow aperture. As a rule, a very small and peripheral section of the membrane suffices ; more rarely, it is necessary to make the iridectomy complete. It would appear that if a clean disc is cut out with a sharp trephine the need of subsequent interference with the iris is minimised, but one cannot be dogmatic on this point.

Toilet of the Wound.—If any tags of iris are seen in the wound, if the pupil has not returned to a central position (thus showing entanglement of the iris in the wound), or if the chamber fills with blood, we use a McKeown's irrigator with very satisfactory results. It acts excellently.

Closure of Wound.—We very rarely employ a suture to keep the flap in place, since experience has shown that it is unnecessary in the great majority of cases. If the flap tends to curl up at the time (it is more likely to do so in the lower segment of the eye), or if it is found out of place at the first dressing, two sutures are inserted. We have done this on three occasions and have had no *contretemps* from delaying the suturing in any of them.

Instillation of Drops.—Our rule is to avoid all instillations immediately after operation, unless the pupil shows an obstinate tendency towards upward displacement, in which case eserine drops (grs. 4 ad. oz. 1) are instilled. On the third day we drop in a solution of atropin (grs. 4 ad. oz. 1) unless the pupil is already widely dilated and active. Our reason for this latter instillation is that we find in congestive cases a strong tendency to the formation of posterior synechiæ ; the quiet iritis which leads to this exudation gives no

other evidence of its occurrence, and must therefore be constantly guarded against.

After-management of the patients.—The eye is looked at 24 hours after operation, and is then almost always found with the chamber refilled, and with filtration freely established. The tension is very low at first, but gradually rises in most cases. I have followed several educated patients very carefully with a view to ascertain whether this fall in tension is dangerous when persistent, and have been unable to find changes either in the fundus or in the media which I could attribute to it.

Should iris tissue prolapse into the trephine hole during convalescence, and should eserine fail to relieve the condition, the conjunctival flap must at once be thrown back, and an excision of the prolapsed portion must be undertaken. If an injection of cocaine and adrenalin solution is made under the flap a few minutes before operation, the patient feels no pain.

Should the flap be found out of place, it may be easily replaced and fixed in position by a couple of sutures. Local anæsthesia is induced by the instillation of cocaine and adrenalin drops.

A short analysis of the tables setting forth the results of operation in cases which returned for examination at varying periods after the operation of simple trephining.

The first trephining for glaucoma was performed on August 2nd, 1909. From that date up to the day I left India 403 eyes had been trephined for glaucoma in my [illegible] self or by surgeons who came to study there. Out of these cases no less than 66 have returned for observation. This represents a very large percentage in Indian practice, and is to be attributed to the great efforts we have made to keep in touch with our patients. An analysis of the returned cases will be found in the appendix to this paper. A short summary of this appendix is here given.

The vision was O in six cases, and success or failure must be here judged by the change in tension ; in one of them, an increase of tension returned and was reduced by a second operation. In the remaining five, the tension remained normal or below normal. In all the six cases the operation was undertaken for the relief of pain, and was successful in every case. To our very great surprise, one of the six returned four months after operation with vision equal to hand movements.

In one, the vision before operation was perception of light ; the trephining was made too far out, vitreous prolapsed into the wound during operation, tension again rose and vision was lost.

In 26 the vision was perception of hand movements before operation. In 15 it remained unaltered : in two it was distinctly worse, and in nine it improved. Of the cases that were worse, one trephined for acute glaucoma was doing well on discharge, but filtration apparently ceased thereafter and the patient did not come back until he was hopelessly blind ; the second patient returned with chronic iridocyclitis and perception of light. Of the improved cases, two were able to count fingers at 1½ feet, and one at one metre. These were seen between seven and nine months after operation. The remaining six were cases secondary to cataract and will be dealt with elsewhere in another paper. After extraction of the cataract one counted fingers at six inches, and one at one foot ; the vision in the remainder was 5/50, 5/50, 5/30, and 5/20 respectively.

So far as the tension in these twenty-six cases is concerned, one required a secondary operation and, as above stated, one was lost by a return of glaucoma.

In the rest the tension remained reduced. The periods that elapsed between operation and the cases being seen again ranged from one to 14½ months. In ten cases the vision before operation was a finger-count from close to the face up to three metres. In two of them vision decreased owing to maturation of a cataract. The remaining eight all showed improvement. In six the vision had gone up respectively to 5/50, 5/30, 6/18, 6/18, 6/12, and 6/9. In every case the tension had remained normal. One was seen 25 days after operation, two four months after operation, one over 10 months, one a year, two 16 months, and one 19½ months later.

In twenty-three the vision before operation was 2/60 upwards to 6/6 nearly. Of these cases one returned in twenty-five days, three in from one to three months, eight in from three to six months, nine in from six months to a year, and two in fifteen months each. In eleven cases the vision improved and tension remain normal or subnormal. In one case the patient's medical man reported over six months later that the results were excellent; but details of vision, etc., were not supplied. In three the vision remained unaltered and the tension low. In one which is known to have done well and in which tension remained subnormal, the vision was not recorded owing to an unfortunate oversight. In one the vision which was 6/6 before operation became 6/9 immediately afterwards, and was still 6/9 six and a half months later; the tension was then 10 mm. Hg.* In a second similar case vision fell from 6/12 before operation to 6/24 afterward, and was still 6/24 four months later; the intraocular tension remained low (8 mm. Hg.). In a third similar case the vision fell from 6/24 before operation to 6/[illegible] terwards and had remained so for over four months. In a[illegible] n which was 6/18 before operation was 6/36, nine and a half months later; tension was subnormal, filtration free, local œdema well marked; the fall in vision was probably due to advancement in opacity of the lens. In two, seen three to four months after operation, local evidence pointed to successful operations, but vision had fallen in one case from 5/15 to 4/50, in the other from 5/20 to 5/30; the patients unfortunately left without affording me an opportunity of ophthalmoscopic examination; the advancing lenticular opacity was the probable cause of the failure in vision. In one patient the vision fell from 2/60 before operation to fingers at 4½ metres ten months later; the cause of deterioration was a quiet iritis with the formation of synechiæ. This last case is the more regrettable as a timely use of atropine would, in my opinion, have saved the sight from deterioration.

When it is remembered that the course of a glaucoma is toward steadily increasing and inevitable blindness, I think it will be admitted that the results of these 66 returned eyes make a very strong case for simple trephining. I leave the more extended tables to the perusal of ophthalmic surgeons with the confidence that those who have themselves a wide experience of glaucoma will appreciate what has been done here.

In a paper read before the Ophthalmological Society of the United Kingdom on June 8th, 1911, I dealt at length with the details of our Madras *technique*. In my paper to be read at Birmingham, at the Annual Meeting of the British Medical Association, I propose to deal with the complications and difficulties met with in performing the operation of simple trephining. These three papers must be taken together. Each is a complement of the other two.

*Tensions stated in mm. of Hg. have been estimated with the Schiötz tonometer, and those stated in mm. simply, with the Maklakoff instrument.

Visual Results of Returned Cases I.

No.	Serial Number	Vision before Operation	Vision after Operation.	Tension before Operation.*	Tension after Operation.	How long after operation were the patients seen again?	Late results of vision.	Later results of tension.	Remarks
1	132	0	0	4 mm. ...	6 mm. ...	7 months ...	0	8 mm. ...	Blind eye
2	145	0	0	4 mm. ..	8 mm. ...	3 months ...	0	4 mm. ...	Blind eye. Reduced to 6 mm. by a second operation
3	149	0	0	4 mm. ...	5·5 mm. ...	25 days ...	0	7 mm. ...	Blind eye
4	183	0	0	4·25 mm. ...	5 mm. ...	3½ months ...	0	5 mm. ..	Blind eye
5	245	0	0	5 mm. ...	8 mm. ..	4 months	Hm.	10 mm. Hg.	Blind eye. Improved
6	282	0	0	4 mm. ...	8 mm. ..	2 months and 4 days	0	25 mm. Hg.	Blind eye
1	60	P.L.	Hm. (?)	4 mm. ...	7 mm. ...	4 months nrly.	0	25 mm. Hg.	*Failure.* Vitreous prolapsed into the wound during operation; the tension again rose and vision was lost; the trephine hole was placed too far away from the cornea

All these were done for relief of pain. Results were successful in each case.

* See footnote on p. 573.

Visual Results of Returned Cases. II.

No.	Serial Number	Vision before Operation.	Vision after Operation.	Tension before Operation	Tension after Operation	How long after operation were the patients seen again?	Later results of vision.	Later results of tension.	Remarks.
1	7	Hm. ...	Hm. ..	5 mm. ..	6 mm. ...	38 days ...	Hm ...	6 mm. ...	Unaltered
2	10	Hm. ...	Hm. .	6 mm. ..	7 mm. ...	8 months and 20 days	F. at 1 m ...	6 mm. ...	Improved
3	20	Hm. .	Hm. ...	6 mm. ...	7 mm. .	8 months and 10 days	F. at 1½ ft. ...	6 mm. ...	Improved. There is a leucoma at the centre of the cornea about 4 mm. in diameter.
4	23	Hm.	Hm. .	5 mm. ...	5 mm. ...	5 months ...	Hm. ...	7 mm. ..	Unaltered
5	25	Hm. ..	Hm.	4 mm. .	8 mm. ...	7 months ...	Hm. ...	8 mm. ...	Improved to fingers at 1½ ft. after an iridectomy for optical purposes
6	27	Hm. ...	Hm. ...	4·5 mm. ..	5·25 mm. ...	6 months ...	Hm. ...	7 mm. ...	Unaltered
7	28	Hm. ...	Hm. ...	4 mm. ...	9 mm. ...	1 year and 12 days	Hm. ..	6 mm. ..	Do.
8	29	Hm. ...	Hm. ...	4 mm. ...	9 mm. ...	3 months and 12 days	Hm. ...	8 mm. ...	Do.
9	44	Hm. ...	Hm. ...	5 mm. ...	5·75 mm. ...	8 months ...	Hm. ...	5 mm. ...	The cataract was extracted by another surgeon; vitreous was lost and the result was a vision Hm. only
10	52	Hm. ...	Hm. ...	4·25 mm. ...	7 mm. ...	3 months ...	Hm. ...	6 mm. ...	Unaltered.
11	74	Hm. ...	Hm. ...	4 mm. ..	6 mm. ...	1 year and 2½ months	Hm. ...	6 mm. ...	V. $\frac{5}{60}$ after cataract extraction. Improved
12	75	Hm. ...	Hm. ...	4·25 mm. ...	6 mm. ...	5 months ...	Hm. ...	4 mm. brought down to 6 mm. after a second op.	Unaltered
13	76	Hm. ...	Hm. ...	4 mm. ...	5·75 mm. ...	Do. ...	Hm. ...	5 mm. ...	Do.

VISUAL RESULTS OF RETURNED CASES. II. *continued.*

No.	Serial Number.	Vision before Operation.	Vision after Operation.	Tension before Operation	Tension after Operation.	How long after operation were the patients seen again?	Later results of vision	Later result of tension	REMARKS
14	99	Hm. ..	Hm. ..	5 mm. ...	6 mm. ..	9 months ...	0.	4 mm.	Failure. Did well up to discharge; filtration appears to have ceased and acute glaucoma supervened. The man stayed at home and did not present himself until all vision had been lost
15	83	Hm. ...	Hm. ...	4 mm. ...	8 mm. .	4 months ...	Hm. ...	5.5 mm. ...	Unaltered
16	92	Hm. ...	Hm. ...	4·5 mm. ...	6 mm. ..	2 months and 23 days	Hm. ...	6 mm. ..	Do.
17	93	Hm. ...	Hm. ...	4 mm. ...	6 mm. ..	Do. ...	Hm. ...	5·75 mm. ...	Do.
18	124	Hm. ...	Hm. ...	4 mm. ...	8 mm ...	9 months and 25 days	Hm. ...	5 mm reduced to 6 mm. by a second operation	Do.
19	142	Hm. ...	Hm. ...	4 mm. ...	6 mm. ...	1 month ...	Hm. ...	7 mm. ...	Do.
20	150	Hm. . .	Hm. ..	4·75 mm. ...	7 mm. ...	6 months and 23 days	P.L.	9 mm. .	Failure due to chronic irido-cyclitis
21	162	Hm. ...	Hm. ...	5 mm. .	8 mm	7 months . .	Hm. ...	7 mm. ...	unaltered
22	169	Hm. ...	Hm. ...	3·75 mm. ...	7 mm. ..	over 10 months	Hm. ...	15 mm. Hg.	V. Fing. at 1 ft. after cataract extraction. Improved
23	172	Hm. ...	F. at 2 m. ...	4 mm. ...	6 mm ...	5½ months	Hm. owing to cataract	7 mm. ...	V. $\frac{5}{60}$ after cataract extraction. Improved
24	221	Hm. ...	Hm. ...	4 mm. ...	7 mm. .	2 months ...	Hm. ...	6 mm. ..	V. $\frac{5}{60}$ after cataract extraction. Improved
25	234	Hm. ...	Hm. ..	5 mm. ...	8 mm. ...	1 month ...	Hm. ...	7 mm. ...	V. $\frac{5}{60}$ after cataract extraction. Improved
26	278a	Hm. ...	Hm. ...	4 mm. ...	9 mm. ...	1 month and 7 days	Hm. ...	30 mm Hg....	V. Fing. at 6 inches after cataract extraction Improved

Results improved in 9, failure in 2, and unaltered in the remaining 15.

Visual Results of Returned Cases. III.

No.	Serial Number.	Vision before Operation.	Vision after Operation	Tension before Operation	Tension after Operation.	How long after operation were the patients seen again?	Later results of vision.	Later results of tension.	Remarks.
1	4	F. at 2 m.	F. at 3 m.	4 mm.	5 mm.	1 year and 4 months	$\frac{6}{18}$	5·75 mm.	Improved
2	5	F. at 1 m.	F. at 3 m.	4 mm.	5 mm.	1 year and 4 months	$\frac{6}{9}$ bar 1 E.	6 mm.	Improved
3	20	F. at 2 m.	Not tested	5·5 mm.	9 mm.	6 months	F. at 10 m. $\frac{6}{9}$ E.	6·5 mm.	Improved
4	47	F. at 3 m.	Do.	4 mm.	5·25 mm.	1 year and 12 days	$\frac{6}{9}$ c. glasses $\frac{6}{6}$	6·75 mm.	Improved
5	281	F. at $\frac{1}{2}$ m.	F. at $\frac{1}{1}$ m.	5 mm.	7 mm.	2 months and 4 days	F. at $\frac{3}{4}$ m.	6 mm.	Improved
6	343	F. at $\frac{1}{4}$ m.	F. at $\frac{3}{4}$ m.	25 mm. Hg.	6 mm. Hg.	25 days	F. at 1 m.	15 mm. Hg.	Improved
7	176	F. cl. to face	F. cl. to face	4 mm.	7 mm.	10 months and 9 days	Hm.	25 mm. Hg.	The deterioration in vision was due to the maturation of a cataract.
8	33	F. at 3 ft.	F. at $4\frac{1}{2}$ ft.	4 mm.	8 mm.	1 year and $7\frac{1}{2}$ months	Hm.	25 mm. Hg.	The failure in vision was due to the progress of a cataract. This has been removed and the patient is convalescing in hospital; he is able to count fingers without a lens. It is possible that he will have good vision.
9	277	I. at 1 m.	$\frac{1}{60}$	5 mm.	8·5 mm. Hg.	4 months	$\frac{6}{18}$ bar 2 ls. N.I.S. or cyl.	14 mm. Hg.	Improved
10	278	F. at $1\frac{1}{2}$ m.	$\frac{6}{36}$	5 mm.	8 mm. Hg.	4 months	$\frac{6}{12}$	14 mm. Hg.	Improved. Operated on in Mls. Govt. Ophthalmic Hospital, Madras, by Dr. Paul, of Sydney

Results: Improved in 9, and less vision in 1 owing to the maturation of a cataract.

Visual Results of Returned Cases. IV.

No.	Serial Number	Vision before Operation.	Vision after Operation.	Tension before Operation.	Tension after Operation.	How long after operation were the patients seen again?	Later results of vision.	Later results of tension.	Remarks.
1	13	$\frac{1}{60}$	Not tested ...	6·25 mm. ...	8 mm. ..	8 months and 8 days	$\frac{6}{60}$; c. + 1·50 sph. $\frac{6}{18}$	7·5 mm. ...	Improved
2	16	$\frac{6}{18}$ bar 1 l. ...	Do. ...	4 mm. ...	6·75 mm. ...	1 year and 3 months	$\frac{6}{18}$ N. I. S. ...	6 mm. ...	Slight improvement
3	17	Do. ...	Do. ...	4·75 mm. ...	7 mm. ...	Do.	$\frac{6}{9}$ c. glasses	7 mm. ...	Do.
4	21	$\frac{6}{9}$ and 2 ls. of $\frac{6}{18}$	Do. ...	4 mm. ...	7 mm. ...	8 months ...	$\frac{6}{6}$; c. glasses $\frac{6}{6}$ bar 2 ls.	7·5 mm. ...	Improved
5	53	$\frac{6}{9}$ c. glasses	Do. ...	4·25 mm. ...	7 mm. ...	3 months ...	$\frac{6}{12}$	6 mm. ...	Do.
6	59	$\frac{6}{12}$	$\frac{6}{18}$	4 mm. ...	8 mm. ...	7 months and 20 days	Not known ...	7 mm. ...	The patient is believed to have had good vision, when he returned 7 months and 20 days after operation, but unfortunately the record of the examiner cannot be found.
7	80	$\frac{6}{9}$ c. glasses...	$\frac{6}{18}$ bar 2 ls. N.I.S.	4 mm. ...	7 mm. ...	3 months and 9 days	$\frac{6}{18}$ N.I.S. ...	6·5 mm. ...	The tension had remained low; vision had fallen. The patient went away without affording us an opportunity of ophthalmoscopic examination
8	84	$\frac{6}{24}$	Not tested ...	5 mm. ...	7 mm. ..	4 months ...	$\frac{6}{60}$ N.I.S. ...	6 mm. ...	Tension remained slightly subnormal and filtration was free; but the cause of deterioration of vision escaped observation.
9	85	$\frac{6}{9}$	$\frac{6}{6}$	5·75 mm. ...	6·75 mm. ...	7 months ...	$\frac{6}{6}$	6 mm. ...	*Improved*; better in spite of development of cataract.
10	106	$\frac{6}{18}$	Not tested	5·75 mm. ...	7 mm.	9 months and 12 days	$\frac{6}{36}$ N.I.S. ...	7 mm. ...	Tension remained subnormal and filtration was free. We ascribe the deterioration in vision to maturation of the cataract.

VISUAL RESULTS OF RETURNED CASES. IV. *continued.*

No.	Serial Number.	Vision before Operation.	Vision after Operation.	Tension before Operation.	Tension after Operation	How long after operation were the patients seen again?	Later results of vision.	Later results of tension.	REMARKS.
11	123	$\frac{6}{60}$ ...	Not tested ..	4 mm. ..	7 mm. ...	9 months and 25 days .	Flat 4½ m ..	7 mm. ...	Synechiæ formed owing to a quiet iritis which was probably in progress even before the patient was lost sight of. This complication should be quite avoidable in future.
12	151	$\frac{6}{60}$.	$\frac{6}{24}$ ..	4 mm. ...	6 25 mm. ..	4 months ..	$\frac{6}{24}$ nm. ...	6 mm. ...	Improved.
13	152	$\frac{1}{6}$	$\frac{6}{6}$ ...	4 mm. ...	6 mm. ...	4 months ...	$\frac{6}{6}$ & 2 ls of $\frac{6}{9}$	6·5 mm. ...	Do.
14	220A	$\frac{1}{6}$	$\frac{6}{6}$ . ..	6·5 mm. ..	7·5 mm. ...	6½ months ...	$\frac{6}{9}$; c. glasses = $\frac{6}{6}$ nearly .	5 mm. Hg. ...	Do.
15	220B	$\frac{6}{6}$ nearly ...	$\frac{6}{6}$ nearly ...	6·5 mm. ...	7·5 mm. ..	Do. .	$\frac{6}{6}$ c. glasses	10 mm. Hg ...	Vision fell after operation from $\frac{6}{6}$ to $\frac{6}{9}$, and was still $\frac{6}{9}$ over 6 months later.
16	246	$\frac{6}{12}$	$\frac{6}{24}$	6 mm. ...	8 mm. ...	4 months ..	$\frac{6}{24}$ c. glasses...	8 mm. Hg. ..	Vision fell from $\frac{6}{12}$ to $\frac{6}{24}$ immediately after the operation; it was still $\frac{6}{24}$ when he was seen 4 months later.
17	258	$\frac{6}{60}$	$\frac{6}{60}$	5 mm. ...	6·5 mm. ...	2½ months	$\frac{6}{60}$	7 mm. ...	Improved.
18	267	$\frac{6}{18}$ bar 1 l. ...	$\frac{6}{24}$	6 mm. ...	6 mm. ...	4 months, 10 days	$\frac{6}{18}$	9 mm. Hg. ...	Unaltered.
19	268	$\frac{6}{24}$ bar 1 l. ...	$\frac{6}{36}$	6 mm. ...	Ups & downs	Do. ...	$\frac{6}{18}$	31 mm. Hg	This is a very difficult case.
20	278B	$\frac{6}{60}$	$\frac{6}{60}$ c. glasses	6 mm. ..	7 mm. ...	2 months and 9 days	$\frac{6}{60}$	17 mm. Hg.	Improved
21	342	$\frac{6}{9}$ bar 3 ls. c. glasses	$\frac{6}{6}$ bar 4 ls. c. glasses	25 mm. Hg.	27 mm. Hg.	25 days ...	$\frac{6}{6}$ bar 3 ls. c. glasses	10 mm. Hg.	Unaltered
22	175	$\frac{6}{60}$	$\frac{6}{60}$	6 mm. ...	8 mm. ...	10 months and 9 days	$\frac{6}{60}$	10 mm. Hg.	Unaltered
23	223A	$\frac{6}{60}$	$\frac{6}{6}$	6 mm. ...	8 mm. ..	3 months and 20 days	$\frac{6}{60}$	15 mm. Hg.	Results good as reported by his medical man but actual vision etc. not accurately stated

Returned in less than 1 month = 1 ; 1-3 months = 3 ; 3-6 months = 8 : 6 months to 1 year = 9 : over 1 year, 2 23.

TRANSLATION.

A NEW GIANT ELECTRO-MAGNET FOR THE EXTRACTION OF MAGNETIC INTRA-OCULAR FOREIGN BODIES.*

BY

PROFESSOR ROLLET,

LYONS, FRANCE.

ALTHOUGH formerly I employed the small hand-magnet for the extraction of magnetic intra-ocular foreign bodies, I have now for a long time been a believer in the giant electro-magnet. Nevertheless, Haab's electro-magnet having failed, in my *clinique*, thrice in one year, to extract scales of metal from the eye, I came to the conclusion that a more powerful instrument, and one differently arranged and simply controlled, ought to be constructed.

A large electro-magnet is invaluable. I have seen one sightless eye regain almost normal vision, and another eye in which suppuration had commenced retained after the extraction of an intraocular foreign body. In the three patients alluded to in the opening paragraph, enucleation became necessary In one of them the metal could not be got on the fourth day, yet it was found free in the vitreous when the eye was excised. While, therefore, the instrument is of great value, on account of the resistance of the tissues, it requires to have an exceedingly strong attractive power for certain cases.

There are, of course, various models of large electro-magnets, but from the clinical standpoint they may be divided into two classes—the horizontal and the vertical. In the first, the magnet stands upon a pedestal, and the patient's eye is brought to the magnet. Such are the magnets of Schlosser; Mayweg (with a weight of 75 kilogrammes and a carrying power of 70 kilogrammes); Schenkel (supporting 100 kilogrammes); the central pole magnet of Mellinger; the old and new models of Haab. In this last the magnet is supported on an enormous casting with a massive base, and weighs complete 138 kilogrammes

There are serious objections to these horizontal magnets. The patient, feeling the sharp pain which is symptomatic of the presence of a magnetic substance, naturally and instinctively draws back his head when the apparatus gets to work. Indeed, sometimes he faints. Besides, antiseptic measures and the necessary preliminary operations are difficult to carry out upon a patient in the sitting position.

Of the vertical electro-magnets, Volkmann's permits of operation on the patient in the dorsal decubitus, which seems to me an indispensable condition of success in this delicate manœuvre. But the apparatus is attached to the wall and this considerably hinders its manipulation, according to the light and to the side to be operated upon. I may specially mention the magnet of Moreau, which has a carrying power of 150 kilogrammes. It has a single upright, fitted with a bracket and a counterpoise. Gayet ingeniously gave a true vertical position to Haab's magnet by suspending it from the ceiling with block and tackle; but the heavy magnet oscillates and its adjustment to the eye is rendered difficult. The assistant may fail in the effort to hold up this great weight, and I have often been in terror lest either the cord or the assistant should give way.

In making this new model I have endeavoured to get a magnet of great power, which shall be freely movable in every direction, and placed exactly above the head of the patient. By increasing the carrying power, I have notably

* From *Revue Générale d'Ophtalmologie*, juin, 1910.

increased, though of course not proportionally, its attractive force; this I have found by comparative experiments. By means of a rheostat the power can be varied to a certain extent. I shall now give a description of the instrument with its new and original points:—

The apparatus, which is entirely metallic and works on the continuous current, is made at Lyons by M. Maury. It consists of (1) a supporting framework, (2) the electro-magnet.

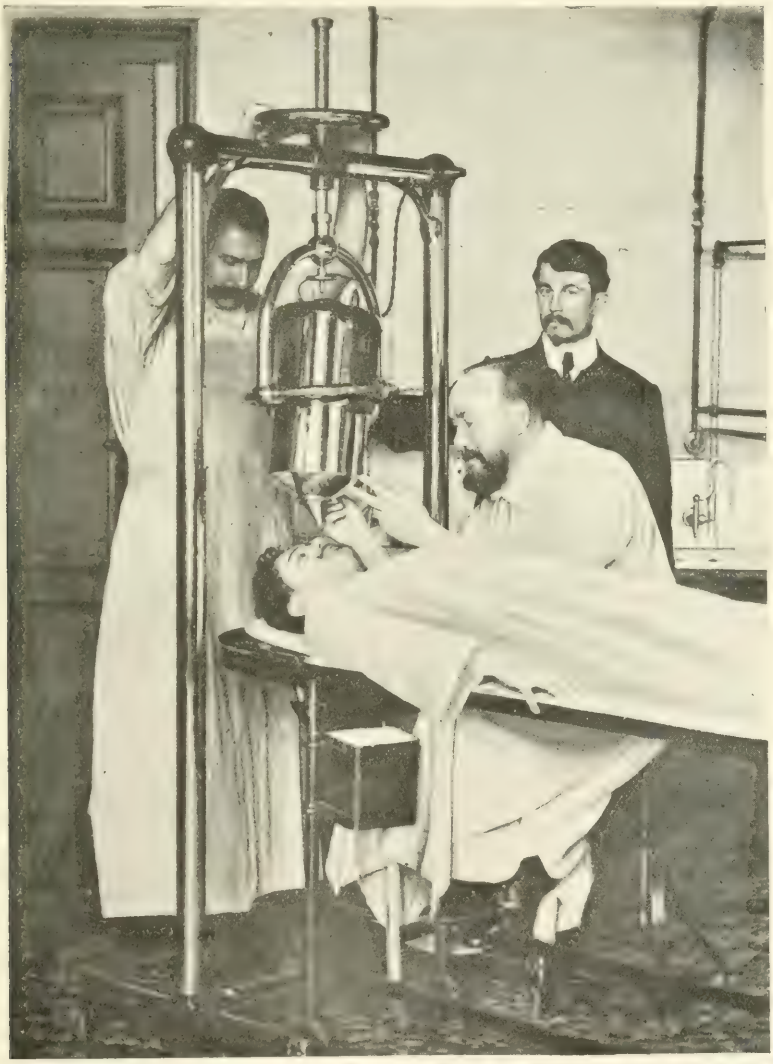

FIG. 1.

(1) The frame is made of four rigid copper tubes screwed together at the four corners. (A, fig. 2). Two tubes are vertical and have rubber castors (C) which rest on the floor and permit of easy movement of the whole apparatus. They are sufficiently far apart to embrace the width of the operating table (fig. 1).

In the middle of the upper transverse tube there is a cross-piece which acts as the housing for the suspension mechanism of the magnet. In the vertical limb of the cross there is a grooved steel screw; the grooving acts as a guide to prevent its rotating, while permitting of up and down movement through a total length of 20 centimetres. This movement is obtained by means of a

PROFESSOR ROLLET'S GIANT ELECTRO-MAGNET.

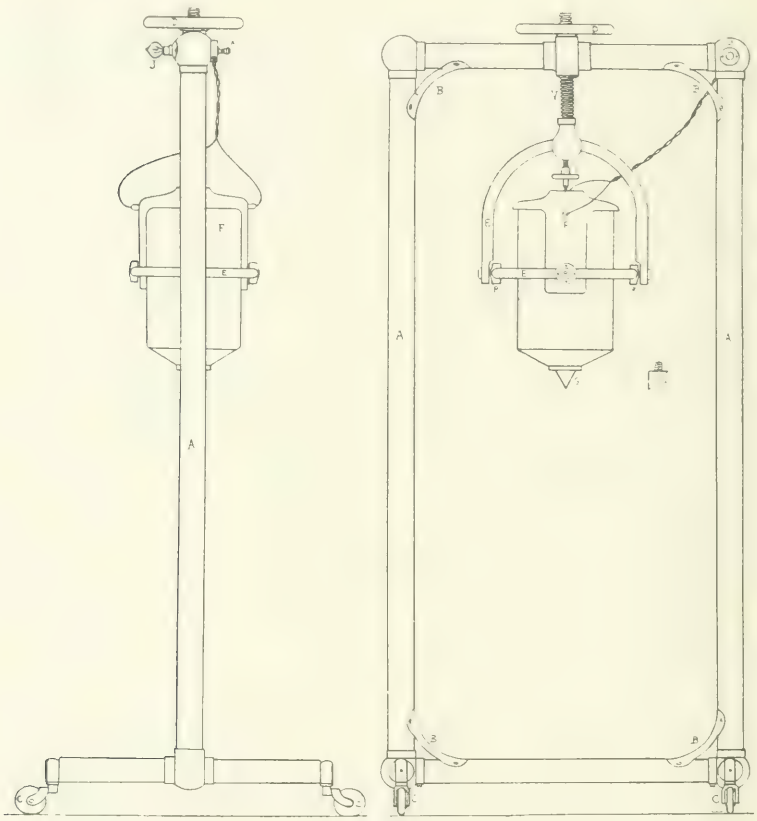

FIG. 2.

(J. MAURY, Maker, Lyons).

A.—Metal frame. B.—Stiffening cramps. C.—Rubber castors. D.—Wheel turning on the screw V and governing the up and down movements of the magnet. E.—Cardan suspension on ball bearings. F.—Electro magnet. G.—Ordinary terminal point. H.—Offset terminal point. I.—Stop point for steadying the magnet. J.—Signal lamp. K.—Electric terminals.

wheel (D) the nave of which is threaded to take the screw just mentioned. One turn of the wheel moves the magnet up or down through 4 millimeters. The system of suspension is on the Cardan principle. At the lower end of the adjusting screw (V) there is a metal ball through which passes a semi-circular piece. This latter carries at its two ends another circle divided into four equal parts. Each of these divisions carries a trunnion in a ball bearing (E). The two ends of the semi-circle being fixed to two of the diametrically opposite ball-bearing supports, the magnet is perfectly balanced

on the other two, and the operator can, with a touch of the finger, manœuvre the bulky magnet and bring its terminal piece near the eye to be operated.

(2) The electro-magnet (F) is of great power. It is made with a core of annealed soft iron, and with a cast iron breech which serves both to enclose the lines of force in a relatively restricted field, and to suspend the apparatus. It is cylindrical in shape, except at its lower end, where it has the form of a truncated cone at an angle of about 120 degrees. It ends in a flat piece formed of the extremity of the soft iron core, into which are fitted the terminal points. In place of the conical detachable terminal point (G) another one can be screwed which has the point (H) "offset" or decentred (Fr. *désaxée*) and directed towards the closure of the lines of force (*Fr. dirigée du côte de la fermeture des lignes de force*) in order to obtain a greater attractive power. The weight of the magnet is 70 kilogrammes. Its extreme mobility with movements of circumduction is such that it has been necessary to fit a little prick-punch (I) to fix it temporarily.

Tested in my presence, it has carried 350 kilogrammes—three men and some weights on an iron plate. I am told that it can carry more than 400 kilogrammes. The current consumption is about 2,500 watts. At the upper part of one of the supports are fixed the electric terminals and a tell-tale lamp (J) which glows when the current passes through the magnet. The attractive power can be varied by means of a rheostat placed near the apparatus. The following is the operative *technique* :—

The patient is recumbent in bed. The field of operation having been disinfected and prepared, the apparatus is wheeled to the head of the bed and the magnet adjusted over the patient's head (fig. 1). As a rule, it is now advisable to do a keratotomy, or even an iridectomy, so as to facilitate the exit of the foreign body. I have, as a matter of fact, given up sclerotomy. The ideal point of exit of the foreign body is at the root of the iris where it is possible for it to perforate the membrane under the magnet and without subsequent development of cataract, as I have observed on several occasions.

The offset point of the instrument is brought near to the eye, the glow lamp indicates that current is passing, and by means of the graduated rheostat the carrying power of the magnet is gradually increased up to 385 kilogrammes, represented by 23 ampères at 110 to 115 volts. The switch allows the circuit to be opened and closed, so as to obtain a continuous or intermittent pull according to circumstances.

In conclusion, it seems to me that this new giant magnet with its great power, its convenience, and its extreme mobility, is destined to be of real use in clinical work.

ERNEST THOMSON.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—COMPARATIVE PATHOLOGY.

(1) Hancock, W. Ilbert and Coats, George.—Tubercle of the choroid of the cat. *Veterinary Record*, January 14th, 1911.

(2) Keil, Richard.—Cyclopia in a goat. (Cyklopie bei einer Ziege.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft 1, S. 12, 1911.

(3) Keil, Richard.—Right-sided congenital microphthalmos in a calf. (Rechtsseitiger Mikrophthalmus congenitus beim Kalbe.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft 1, S. 23, 1911.

(4) Stargardt, K.—Myopia in the monkey. (Kurzsichtigkeit beim Affen.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft 1, S. 27, 1911.

(1) **Hancock** and **Coats**, of London, describe the clinical and pathological features of six cases of tubercle of the choroid in cats.

In five of the six cases the condition was bilateral. The first thing observed was that the cat was blind or almost blind, although the animal appeared to be in good condition. At the same time the temperature (taken in two cases only) ranged from 102° F. to 104° F. The pupil was widely dilated, and by oblique illumination, a detachment of the retina was sometimes visible. Ophthalmoscopic examination showed areas of soft-edged, yellowish exudation lying beneath the retinal vessels, and retinal hæmorrhages were rarely absent. Detachments of the retina formed comparatively early in the course of the disease. At a later stage, the anterior part of the eye began to manifest signs of inflammation, such as pericorneal redness, changes in the colour and pattern of the iris or the formation of new vessels upon its surface, posterior synechiæ, vascular plexuses on the surface of the lens, and changes in the intra-ocular tension.

A complete autopsy was made in five of the six cases. It is of interest to note that in one instance the choroidal affection (bilateral) was the sole tuberculous lesion found in the animal's body, thus affording some substantiation to the late George Carpenter's view, namely, that in human beings the tubercle of the choroid might conceivably be primary.* In the remaining four cats the lungs were diseased ; the kidney was affected in three. The liver, spleen, suprarenal capsule, and mediastinal glands were affected each in one cat. The brain and meninges were invariably normal. Inoculation experiments were made in three instances. Results were positive in two of the cases. An acid-fast bacillus was found in the kidney of one cat, but the tubercle bacillus could not be demonstrated with certainty in the choroid.

The pathology of the ocular lesions may be briefly described as follows.—The choroid, especially near the posterior pole of the eye, is thickened, and its cut surface presents a marbled appearance. The retina is usually adherent to the thickened choroid, but detached elsewhere. The diseased areas of the choroid, when examined with the microscope, are found to be made up of granulation tissue, the most typical element of which is an epithelioid cell, with a large nucleus, round, oval, or irregular in outline, a prominent nucleolus,

Transaction Ophthalmological Society U.K., Vol. XXIX, 1909, p. 228.

and a rounded or polygonal body. Giant cells are extremely rare. So-called "tubercle systems," as in human tuberculosis, can scarcely be said to occur. Caseation is not a particularly marked feature. The retina is generally œdematous, degenerated, and may, indeed, be almost entirely necrotic.

In their chief pathological features the cases described by Hancock and Coats correspond with the chronic (or conglomerate) type of tuberculosis met with in the human eye, and more particularly still with the form described by Wagenmann (*Bericht der Ophthal. Gesellsch.*, Heidelberg, 1891, p. 60), which is characterised by diffuse thickening of the choroid. Early bilateral incidence, however, common in cats, is exceptional in man.

SYDNEY STEPHENSON.

(2) **Keil**, of Leipzig, reports a case of cyclopia in a goat. The brain consisted of a single vesicle, differentiation into hemispheres not having taken place. There was no chiasma, and the optic nerve was single. The orbits were fused. With regard to the eyes, two corneæ, irides, ciliary bodies, lenses, and retinæ were present, or at least indicated. There was a typical coloboma of each iris, ciliary body, and choroid, due to a large persistent strand of mesoblast. At the edge of the coloboma the secondary optic vesicle was thrown into a complicated system of folds. At the upper edge of the nerve the lamina cribrosa was imperfectly developed, and a portion of the secondary optic vesicle had become protruded into the gap (minimal form of microphthalmos with cyst). The nerve contained no nerve fibres, but consisted of neuroglia alone. *Plaques* of cartilage and bone were found in the sclera and in the orbit. GEORGE COATS.

(3) The cause of the microphthalmos in this case by **Keil**, of Leipzig, was a large strand of persistent mesoblast which ran forward through the vitreous, and passed round the anterior edge of the secondary optic vesicle to be inserted into the anterior part of the globe. *Plaques* of cartilage were contained in the strand. The cornea was imperfectly differentiated, the anterior chamber unformed, and the lens totally absent. In the line of the fœtal cleft there was an ectatic coloboma of the choroid and retina, at the edge of which the secondary optic vesicle was thrown into folds.

GEORGE COATS.

(4) Myopia, usually slight in amount, but sometimes as much as 7 D. to 9 D. is known to occur in the horse. It is said by Riegel to be an index, not an axial, error. Among seven monkeys used for experimental purposes, **Stargardt**, of Kiel, found one with about 5 D. of myopia. The animal had been born in freedom and had been in captivity about eighteen months. Externally and ophthalmoscopically the eyes were normal. The excised globe measured 18 mm. horizontally, 21 mm. sagittally; the sclera was of normal thickness. The temporal side of the nerve showed none of the changes characteristic of myopic crescent; on the nasal side there was a certain amount of overhanging of the choroid, but as the author found a similar condition in a hypermetropic monkey, he does not regard it as a true myopic supertraction, but as an accidental anomaly. By comparative measurements on other monkeys' eyes he proves that the difference between the sagittal and horizontal measurements was much greater than in emmetropia, and that the curvature of the cornea and the distance of the lens from the cornea were approximately normal. The myopia was therefore axial. In discussing the ætiology the author justly remarks that "near work, reading, and writing may in this case be completely excluded." He believes, therefore, that the myopia was of congenital origin, or at least founded on a congenital basis.

GEORGE COATS.

II.—FIXATION OF THE CRYSTALLINE LENS.

Linsenmeyer, Josef.—Comparative researches on the possibility of fixing the external form of the lens. (Vergleichende Untersuchungen über die Moglichkeit einer Fixierung der äusseren Linsenform.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft 1, S. 37, 1911.

In this paper **Linsenmeyer** investigates the effect of the fixatives in common use on the form and volume of the lens. His method was as follows.—The cornea and iris were dissected off, the zonula was carefully torn through, without touching the lens, by means of a glass rod with a rounded point, and the lens cautiously lifted out of its place with a small spatula. The volume was then measured by a special apparatus constructed on the principle of weighing the amount of distilled water displaced when the lens was immersed; inasmuch as grammes and cubic centimetres are convertible terms with distilled water, this gave at once the required volume. The antero-posterior measurement was taken by calipers in a vessel whose wall was of known thickness, the lens being submerged so that its own weight should not cause distortion. Two equatorial axial measurements at right angles to one another were then taken on a slide, after which the lens was plunged into the fixative which was to be studied, and similar measurements were again undertaken at suitable intervals.

It can scarcely be pretended, of course, that this method gives a true figure of the lens in the living eye, but for a comparative study of the effect of different fixatives, it is probably sufficiently accurate. The results were as follows:

Formalin in 10 per cent. solution caused considerable shrinkage, with wrinkling of the capsule, especially at the poles. Weak formalin and distilled water caused the lens to swell and to become rounder; spontaneous rupture of the capsule might even occur.

Müller's fluid caused swelling for several weeks, then shrinkage.

Saturated mercuric chloride and with cane sugar ($1\frac{1}{2}$ to $4\frac{1}{2}$ per cent.)—a combination which is said to cause a minimum of shrinkage in the whole globe—produced only very slight change in the volume and diameters of the lens, and hardened it quickly, but gave rise to the formation of clefts.

Zenker's solution in a very short time produced changes in the lens substance and capsule, together with clefts.

With picric acid, the lens became swollen and round, and clefts were produced.

With Orth's solution (Müller and 20 per cent. formalin) there was decrease in all diameters and in the volume. The surface remained smooth and the consistence was good.

Since weak formalin produces swelling and Müller's fluid shrinkage, it ought to be possible to find a combination of these two which will cause neither. Linsenmeyer finds that this object is best attained by an addition of formalin in about 3 per cent. strength; unimportant variations occur according to the age of the lens. This solution also fixes the lens well in the unopened globe.

The observations were made chiefly on the lens of the horse and pig. If the same action is obtained in the human eye, and if the mixture proves itself a good cytological fixative, a boon will indeed be conferred on the pathologist, to whom the satisfactory fixation of the lens has always been a problem, and who is constantly in doubt whether to attribute slight changes to pathological or to artificial processes.

GEORGE COATS.

III.—THE TAPETUM LUCIDUM OF THE MAMMALIAN EYE.

Hess, C.—The tapetum lucidum of the mammalian eye. (Beiträge zur Kenntnis des Tapetum Lucidum im Säugerauge.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft 1, S. 3, 1911.

Hess, of Würzburg, discusses the cause of the brilliant colours in the animal tapetum. In the case of the tapetum cellulosum of the carnivora they have been attributed to the presence of minute pointed crystals, insoluble in hydrochloric, sulphuric, or nitric acids, and probably of organic nature. Hess finds that if the tapetum be placed in 10 per cent. hydrochloric acid it becomes very dark for one or two seconds, after which its colour returns and remains; if it be now placed in water it again becomes dark; and if replaced in acid it regains its colour. If slowly dried, it loses its colour, but acquires it again if placed in water. With 25 per cent. caustic potash it becomes black, but the colour may be restored after long immersion in water. The formalin fixed tapetum behaves in a similar manner, but does not always fully recover.

By studying the effect of these agents on sections, Hess came to the conclusion that the disappearance of colour was due to the tapetum becoming transparent, and so permitting the pigmented layers of the choroid to be seen. He believes, therefore, that the colours are a physical phenomenon, and due to interference, such as occurs from a finely ruled grating. By measurements of the lines of such a grating and of the fibres of the tapetum, he controverts a statement of Pütter that the fibres are too coarse to give rise to interference. Hess also combats views expressed by Pütter that the function of the tapetum is to cause a general diffusion of light within the eye, and that such diffusion would be advantageous for vision under low illumination. He shows that a given ray passing through a visual element to the tapetum is simply reflected back on to the same element, which it stimulates more strongly.

Another mechanism to which Pütter attributes a similar function of "supplementary illumination" (*Nebenbelichtung*) is found in most teleostean fishes; namely, that the circumlental space is only partially covered by the iris. But inasmuch as under water no refraction occurs at the cornea, Hess shows that the amount of unrefracted light which passes through the circumlental space is exceedingly small in amount, and reaches the retina only in the periphery; it must be too feeble to give rise to any appreciable illumination by reflection.

Hess finds also that the tapetum fluoresces in the ultra-violet region of the spectrum. Whether the observation is of any physiological importance or is merely a physical peculiarity, is doubtful. Most of the ultra-violet rays are believed to be absorbed by the cornea and lens. GEORGE COATS.

IV.—PERIMETRY.

(1) Charles, J. W.—The importance of taking the visual fields as a routine procedure in ocular examinations. *American Journal of Ophthalmology*, February, 1911.

(2) Cushing, Harvey and Heuer, George J.—Distortions of the visual fields in cases of brain tumour. Statistical studies. (First paper.) *Johns Hopkins Hospital Bulletin*, June, 1911.

3 Camp, Carl D.—**The diagnostic value of dyschromatopsia in nervous diseases.** *Journ. Nervous and Mental Disease*, June, 1911.

(1) "There can be no doubt," says **Charles**, "that the careful consideration of the field of vision, especially for green and red, is essential in all cases of brain implication and syphilitic nerve disease. That there is a certain general standard or general average in the limits of these fields which we call "normal," there is also no doubt; but there is one point which I especially wish to emphasize, *viz.*, that there are individuals whose visual fields vary so decidedly from the normal standard as to appear pathological, when in reality their colour limitations are as congenital as congenital colour-blindness. Therefore we cannot say, 'this field is caused by disease and this one is not' unless the taking of fields becomes a routine part of our practice in all examinations."

One need not go into the particular case which has led Charles to a confession of not having taken the fields when, as afterwards turned out, they would have been of service. It is easy to be wise after the event, and we all make errors of judgment. While, no doubt, the fields ought to be taken in every case as a matter of routine, it must not be forgotten that in many cases in private practice this would mean an extra consultation, for which the patient must pay. "He should be made to understand," says the author, "that our work is not that of opticians to be impressed into glass fitting, but that he comes to us for medical advice." And what about one's public practice, where a hundred or so of patients have to be seen in a half day by the surgeon and an assistant or two? It is to be feared that, even if possible in private practice, routine charting is not so in hospital practice, for a proper investigation of the fields is a time-consuming process, even granted an intelligent patient.

Another point occurs to the reviewer (the latter apologises for indulging in so much criticism), namely: that in order that the limits of the fields should be available for future reference in every patient—whcih is one of Charles' points—it is absolutely essential that the illumination be of an unvarying standard. Such a standard can only be obtained with artificial light. So that while one is inclined to admit Charles' contention for taking the fields in all cases, as technically correct, one feels at the same time that it is a counsel of perfection. ERNEST THOMSON

(2) This is the first of a series of five papers in which **Cushing** and **Heuer**, of Baltimore, review the perimetric results obtained by the examination of the eyes of 200 patients suffering from tumour of the brain. In most of the cases a continuous series of perimetric records was secured. The authors usually employed paper discs of 0.5 mm. diameter in the examination of the fields, and, as a rule, confined their colour observations to blue and red. The green field they found to be less useful for their purposes.

The two hundred cases analysed in the present communication have, with one or two exceptions, been treated surgically. It has been possible to plot trustworthy perimetric charts in 123 of the 200 patients (61.5 per cent.), and repeated observations have been made in most of the cases. Owing to blindness, extreme youth, unconsciousness, aphasia, etc., no perimetric examinations were feasible in the remaining 77 cases of the series. Of the 123 patients in whom reliable charts were secured, 27 showed visual fields that were normal in all respects. In the remaining 95 cases the visual fields displayed abnormalities of diagnostic value. In 42 cases defects occurred which were of value in localisation. The charts of the other 53 cases showed fairly symmetrical interlacing with more or less tendency towards inversion of the colour fields accompanied by some contraction of the form fields, an

indication of increased intra-cranial tension. Cushing and Heuer analyse the three subdivisions *seriatim*:—1. *Normal fields.*—As already stated, normal fields were observed in 13.5 per cent. of the total 200 cases, and it is of interest to note that almost all were met with in the second one hundred cases of the series, an evidence of earlier diagnosis. In most of the cases there was no suspicion of œdema of the optic papilla. It is obvious that normal fields will be more likely to be seen when the tumour primarily affects an area, such as the pons or hypophysis, which quickly yields localising symptoms. On the other hand, the diagnosis of tumours of relatively "silent" areas of the brain will depend more frequently on the existence of general pressure symptoms, among the more important of which are perimetric deviations. 2. *Fields showing colour interlacing* (*dyschromatopsia*).—In 53 of the cases, or 26.5 per cent. of the entire series, interlacing, with more or less inversion and contraction of the colour fields, was the sole perimetric abnormality. Interlacing proves to be one of the most constant signs of an increase in pressure, and, what is even more important, that it is occasionally the earliest of these signs. In a number of instances it has preceded choked disc, and, moreover, when accompanied by choked disc, it has commonly been observed that the signs disappear after the operation of decompression before there is any considerable subsidence of the neuro-retinal swelling. 3. *Hemianopic fields.*—Field defects, presumed to indicate direct implication of the visual pathway, were observed in 42 of the 123 patients in whom examination was possible. In this group the authors include 12 cases of tolerably typical binasal hemianopsia, in all of which advanced choked disc was present, often with complete achromatopsia. The 42 cases of hemianopsia are divided by the authors into three main groups: (1) the 12 cases already mentioned of complete binasal loss of vision with some preservation of the temporal fields; (2) six cases of bitemporal blindness; and (3) 24 cases of homonymous defect, whether vertically total, quadrantal, or fragmentary homonymous. In this group must also be included a few cases of superior hemianopsia.

Summary.—In a series of 200 cases of brain tumour, Cushing and Heuer have secured trustworthy perimetric records in 122, and the charts have shown (1) normal fields in 27 cases, (2) dyschromatopsia, with more or less contraction, in 53 cases, and (3) hemianopsia or a tendency to hemianopsia in 42 cases. SYDNEY STEPHENSON.

(3) By "Dyschromatopsia" **Camp,** of Ann Arbor, means a reversal, partial or complete, of the normal relations of the colour fields. He has examined the case records at the University Hospital of Michigan for cases showing this symptom, and reports the results of his investigation in the present communication. The results may be summarised as follows:—

"Since it is demonstrated that dyschromatopsia occurs in both organic and functional nervous diseases, its presence will be of little aid in differentiating between them. There is some reason to believe, however, that its presence might be valuable in differentiating between the different functional conditions. It occurs frequently in hysteria, and apparently does not occur in the other neuroses unless they are complicated by hysteria. It might be of value in the differential diagnosis of hysteria from neurasthenia, Graves' disease, idiopathic epilepsy, psychasthenia, and some of the psychoses, all conditions which are frequently mistaken for hysteria. I have not found inversion or interlacing of the colour fields in cases of multiple neuritis or in retrobulbar neuritis, though it might occur as it has been observed in various intoxications, and these same intoxications may also cause multiple neuritis. Dyschromatopsia is frequently found in cases of tabes dorsalis and, in my

experience, not in other affections of the spinal cord; however, the number of cases reported is too small to permit any definite conclusions. Inversion or interlacing of the colour fields seems to occur in brain lesions if these lesions are generalized, but not from strictly localised lesions, and the nature of these lesions, whether they are circulatory, syphilitic inflammations, or due to trauma, apparently makes no difference. I should agree with Dr. Cushing that any inversion or interlacing of the colour fields which might occur from brain tumour would probably be due to the general disturbance caused by the tumour, and it would, therefore, have no localizing value."

SYDNEY STEPHENSON.

V.—RADIOGRAPHY.

(1) **Nogier, Th.—The advantages of extra-rapid radiography in the determination and localization of intraocular foreign bodies.** (Avantages de la radiographic extra-rapide pour la recherche et la localisation des corps étrangers de l'œil.) *La Clinique Ophtalmologique*, 10 novembre, 1909.

(2) **Randolph.—The importance of prompt X-ray examination in cases of penetrating wounds of the eyeball where the foreign body can neither be seen nor accounted for.** *Ophthalmic Record*, July, 1910.

(1) Those interested in radiographic details may refer with advantage to this short article by **Nogier**, of Lyons. ERNEST THOMSON.

(2) **Randolph**, of Baltimore, relates two cases illustrating the value of X-ray examinations.

In the first case there was no discoverable wound of the conjunctiva, no objective sign beyond a slight flush over the internal rectus insertion, and ophthalmoscopic examination was negative. The patient was confident that nothing had entered his eye. Two days later, inflammatory symptoms set in, and an X-ray photograph showed two very small foreign bodies imbedded in the ciliary body.

In the second case a man had been complaining of pain in the eye from time to time, there was pericorneal redness, and vision was reduced to the counting of fingers. An oculist had assured him that there was no foreign body in the eye. There was a small scar on the temporal side of the cornea, the vitreous was hazy, and ophthalmoscopically a small detachment of the retina could be seen below and to the temporal side. An X-ray photograph showed a foreign body, the size of a match head, imbedded in the choroid not far from the macular region. It was easily removed by means of a magnet, through a scleral incision. Later, it was found necessary to enucleate the eye. J. JAMESON EVANS.

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VI.—THE ELECTRO-MAGNET.

(1) **Marri, E.—The giant electro-magnet in ocular surgery.** *Annali di Ottalmologia*, Vol. XXXVI, Fasc. 5, p. 319.

(2) **Wirtz, R.—The ring-magnet of Mellinger in a suspended mounting.** *Wochenschrift f. Ther. u. Hygiene des Auges*, Dezember 10, 1908.

(3) **Cecchetto, E.—A note upon the removal of iron from the eye by means of Volkmann's electro-magnet.** *Annali di Ottalmologia*, Vol. XXXIX, Fasc. 1-2, 1910.

(4) **Haab, O.—Concerning a new model of my giant-magnet, and how such an instrument should be used.** *Arch. f. Augenheilkunde*, 1910, Band LXVIII, Heft i, 1910.

(5) **Luedde, W. H.—The electro-magnet in ophthalmic practice, presenting a modification of the Haab giant-magnet.** *American Journal of Ophthalmology*, July, 1910.

(6) **Rollet, E.—On the extraction of intra-ocular metallic bodies by the electro-magnet.** *Revue Générale d'Ophtalmologie*, 31 octobre, 1910.

(1) This article, by **Marri,** of Turin, contains a table of forty cases treated by the Hirschberg electro-magnet, and is an appeal for the general employment of that appliance, or of some similar model, which ought, in the author's opinion, to be found in every eye department.

A. ANTONELLI.

(3) **Wirtz** describes a method of suspending the ring-magnet from a rail fixed to the ceiling, along which it can travel. The magnet can be set at various heights and in different planes or angles. In addition to the numerous advantages of the ring-magnet (*see* THE OPHTHALMOSCOPE, 1909, p. 325 and 576, and 1910, p. 582) this new mounting permits of the patient lying on an operation table, with little danger of syncope. It yields a good, clear field, and when the eyeball has to be opened, the instrument used may become magnetic and take the place of the small hand-magnet often employed for this purpose.

W. B. INGLIS POLLOCK.

(3) The five cases reported by **Cecchetto,** of Parma, confirm the immediate success that may follow the application of the electro-magnet, but they also show the very disappointing results with regard to the ultimate conservation of sight.

A. ANTONELLI.

(4) This paper, by **Haab,** of Zürich, discusses the claim to priority of invention, and reopens the old question as to the comparative utility of giant- and hand-magnets.

The giant-magnet operation should be so arranged that the foreign body is drawn directly forwards, so that it may glide past the lens and enter the anterior chamber. A scleral incision is, except when the splinter is very large, highly undesirable, and leads to detached retina. The original magnet has been much improved. It is now unipolar, and has four separate pole pieces which can be screwed on. A foot switch enables the current to be thrown in exactly when wanted. No rheostat is necessary, for if a mild action be desired, the pole can be kept further off the eye. To have two sizes is like having a large and small hole in a door for a cat and her kitten to use!

T. HARRISON BUTLER.

(5) The first portion of this paper by **Luedde**, of St. Louis, is taken up with general considerations as to magnet operations—the large *versus* the small magnet, the necessity of the most accurate possible localization of the foreign body, and with interesting cases. The cases, the author himself says, form in no sense a statistical report, and no deduction of percentage of success or failure is possible. In the second portion of the paper a description is given of a new giant-magnet made by the Pan-Electric Service and Appliance Co. (St. Louis) and the Smith-Davis Manufacturing Co. at the instigation of the author. The magnet is of the horizontal type, after the fashion of the Haab magnet, but the diameter of the coil is maintained throughout. The magnet does not taper at the ends, but is provided with longer and shorter tips, the former for use when the full power is not required. It is mounted on an adjustable carriage on wheels, and is intended to be used with the patient lying on the operating table while the surgeon manipulates the position of the patient's head in relation to the magnet. In this respect its use differs from that of the Haab magnet, and it is claimed, with justice surely, that this is a better method of procedure than to have the patient sitting and brought to the magnet. Operative measures may be conveniently undertaken, and "if the magnet can be of service at any stage of the operation, a turn of the head or the shift of the pillow will bring the eye to its tip." The measurements of this magnet coincide very closely with those of Haab's. The diameter of the coil is 11·5 cm., that of the Haab 10 cm. The length is 55 cm. increased to 60 cm. by the long tip, that of Haab's is 60 cm. The copper wire coil is 50 cm. thick, and will take a current of 500 volts easily. Other specifications, such as the amount of current consumption and the lifting and the attractive force, are omitted by the author. In using the magnet, the control of the current is left to an assistant, and is not done by the operator's feet. ERNEST THOMSON.

(6) **Rollet's** article is one which deserves to be read by every ophthalmic surgeon. We shall endeavour to embody in an abstract its principal points.

Being unable to obtain in textbooks of physics the information which he sought, Rollet proceeded to study for himself, in a practical manner, the variations which may be produced in the attractability of a fragment of metal according to its composition, its form, and its weight.

Firstly, regarding the composition, the progress of metallurgy has introduced a number of alloys of the metals which we call "magnetic." These must be studied as to their magnetic qualities. But, before entering upon this subject, there is one important fact which seems to be little known, and that is that in country places, and specially where poachers are concerned, gunshot may be made, not of lead, but of iron.

Coming now to the magnetic qualities of iron and its alloys, these are divided into two principal groups, *viz.*, alloys of iron and carbon (steels) and those of iron and metals (ferros). Speaking first of the steels, the author gives a table showing the composition and the magnetic permeability of nine different specimens, *viz.*, puddled iron, extra soft steel, soft steel, medium hard steel, hard steel, very hard steel, chrome-nickel steel, *fonte grise*, and nickel steel. The appearance of these specimens, made up in 20 gramme cylinders, is identical. They are all commercial metals, used for various purposes. Tested with Rollet's giant-magnet each of these cylinders was sharply attracted to the magnet at distances varying from 6½-7 cm. with the exception of the nickel steel one, which only came to the magnet at 6 mm. and did not adhere strongly to it. The permeability of this steel, containing 25 per cent. of nickel, is almost zero, yet it is daily becoming industrially more important.

The experiments were repeated with splinters weighing 1 cgm. The fragments were attracted to the magnet at distances varying from 105 to 135 mm. Nickel steel only came, however, at 40 mm. Fresh rust does not sensibly influence the magnetic qualities of certain splinters of iron.

Next as to the *ferros*, these are combinations of iron with other metals and metalloids, such as silicium. These bodies which are used in the manufacture of steel interest us very greatly because they often seriously alter the magnetic qualities of a steel, and also because they themselves are often projected into the eye of the workman. Of these *ferros* the author has drawn up a table which gives the composition of each and the attraction distance of each to the magnet. This table calls for study in the original. Some curious results emerge. Thus, the various allies of ferro-titanium are attracted at 4 to 10 cms., the ferro-chromes at 1 to 9 cms. with marked modifications of the magnetism according to the alloy. The ferro-tungstens are also interesting. The splinter containing 3 per cent. of carbon and 61 per cent. of tungsten jumps to the magnet at 6 cms. but when the proportion of tungsten is increased the magnetism becomes nil. The ferro-siliciums can be attracted at 2 mm. for 27 per cent. of silicium but not for higher percentages, etc., etc.

In general terms, it is the amount of iron which determines the magnetism of the alloy. Splinters of pure chromium, tungsten, molybdenum, titanium, tantalium, cadmium, aluminium, proved to be uninfluenced by the magnet. Nevertheless, according to the classification of Gavarret, chromium, titanium, and molybdenum should be attracted by magnets, while tungsten should be repelled. Vanadium and manganese adhere slightly to the magnet, but without any real attraction at a distance. Nickel (99 per cent.) is attracted at 8 cm., cobalt at 9 c.m. These are the only truly magnetic bodies except iron.

It is obvious from what has been said that if the magnet fail to extract from an eye a steel foreign body, the fault may lie with the steel, not with the magnet.

Secondly, regarding shape and weight. It was found that the shape of a foreign body influenced its magnetic attraction. For example, a cube of iron of 10 cgms. required a closer approximation of the magnet than an oval, a bi-conical, or a cylindrical mass of the same weight, while a bar with sharp ends was even more easily attracted. Experiments with pieces of fine iron wire gave curious results. The author's words may be quoted. "A thread of iron weighing 5 mgrs. and 5 mm. long was attracted at 18 cms.; another weighing 1 cgm. and 1 cm. in length, lifted at 21 cms. If I took an iron thread weighing 2 cgms. and 2 cms. long, I could attract it at 24 cms.; if I folded it upon itself the attraction fell to 20 cms.; folded into four it did not rise till 14 cms. An iron thread of 10 cgs., and more than 4 cms. long jumped to the magnet at 27 cms. while the cube of the same weight did not start till 8 cms.

So also a block of iron weighing 20 grms. will come to the magnet at about 7 cms. and a mote of only 1 cgm. at $11\frac{1}{2}$ cms. and the distance will be more than doubled if the particle be a very fine iron thread. Three particles of cobalt of 1, 5, and 10 cgms. were attracted at almost the same distance.

The shape of the metallic body influences its attraction much more than its weight, elongated bodies such as needles being more easily attracted than small blocks.

The author next describes the effect of magnetization on various shapes of body, previous to the actual rise to the magnet, in accordance with the law that the body places itself with its long axis in the direction of the magnetic force. If a body be placed under water the actual result depends on the strength of the magnet. If the latter be strong enough it will attract the

metal straight out of the water, but if weaker, the metal may be arrested at the surface by the surface tension of the liquid.

The great influence of the strength of the current passing through the magnet is described with examples.

Various experiments were made with iron particles introduced into pigs' eyes. The movement of the particles to place themselves in the magnetic line could be observed, as could also the circumnavigation of the lens by the metal.

Finally, then, these experiments showed the necessity of a powerful magnet and indicated how it is necessary to take into account the strength of the current and the shape of the fragment, while its weight, on the other hand, has only a secondary influence. ERNEST THOMSON.

VII.—EXPERIMENTAL WOUNDS OF THE CILIARY BODY.

Contino.—Experimental researches on wounds of the ciliary body. (Ricerche sperimentali sulle ferite del corpo ciliare.) *La Clinica Oculistica*, Feb.-March, 1911.

The conclusions to which **Contino** comes are as follows:

As soon as a wound is made in the ciliary body, the unstriped fibres retract and cause a gaping between the lips of the wound, into which the vitreous protrudes. Blood, coming from the cut vessels of the region, infiltrates into this vitreous.

If the wound is small and radial, the blood goes along the fibres of the zonule, only as far as the edge of the lens. If the wound is more extensive and transverse, the blood can be recognised as far as the fundus.

At the same time there comes about an intense hyperemia of the ciliary processes in the neighbourhood of the wound, which extends to the whole of the ciliary circle, to the iris, and even to the superjacent sclera.

If the injury has perforated the sclerotic, the external wound becomes closed by the œdema of the conjunctiva, even if there be prolapse of the vitreous.

Repair begins on the second day. In wounds which have not passed beyond the ciliary body and have begun in the cornea, we can see that the loose tissue (the continuation of the suprachoroidal tissue) between the sclera and the ciliary muscle, shows proliferation of the fixed cells (karyokinetic changes). These new-formed elements unite into fibres, which run from one side to the other of the wound, and eventually fill the gap between the scleral fibres, if these have been incised.

On the third day, the new-formed tissue protrudes a little beyond the surface of the ciliary body.

The vitreous takes no active part in the process of repair. In the case of penetrating wounds of the sclera, the suprachoroidea supplies part of the material of repair, but the episcleral tissue is more important, sending a mass of new-formed elements, which project between the lips of the scleral wound, and join the other elements. The epithelium of the ciliary region of the retina never shows any sign of repair in any wound, and this is the case also of the smooth muscle fibres of the ciliary muscle. A true healing, therefore, is never seen in these wounds.

The intense hyperæmia which is set up in the ciliary body after a wound, is sometimes followed by atrophy, especially if the processes have been wounded. This hyperæmia begins to diminish on the twentieth day. By the thirtieth day the surface is flat or a little depressed. The fibres of the scar in the sclerotic have assumed the appearance of the scleral fibres, but there is an excess of fixed elements in the new tissue, and of small vessels running into it from the episclera.

The scar tissue in the ciliary region shows a less regular disposition, and appears made up of stellate cells.

The fibres of the sclera take small part in the process of repair. The conjunctiva heals very rapidly; even after 24 hours the scar is invisible. This rapid healing has a very favourable action on the later course of these wounds. HAROLD GRIMSDALE.

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(20) Molesworth, T. H.—Irido-dialysis. *British Medical Journal*, January 22nd, 1910.

(21) Keiper.—Rupture of the sclerotic with subconjunctival dislocation of the crystalline lens. *Ophthalmic Record*, January, 1910.

(22) Dalén, A.—A case of evulsion of the optic nerve. (Ein Fall von Evulsio nervi optici.) *Mitteilungen aus der Carolinischen Medico-chirurgischen Instituts zu Stockholm*, 1910.

(23) Klein, S.—On wounds of the lens and lens capsule. (Ueber Linsen- und Linsenkapsel-Verletzung.) *Centralbl. f. prak. Augenheilkunde*, März, 1910.

(24) Erb, A.—Two rare cases of wounds of the eye by fragments of iron. Zwei seltene, Fälle von Eisensplitterverletzungen des Auges.) *Zeitschrift für Augenheilkunde*, April, 1910.

(25) Dutoit, A. A.—On the relationships between surgical emphysema of the orbit and traumatic enophthalmos. (Ueber die Bezeihungen zwischen dem Luft Emphysem der Orbita und dem traumatischen Enophthalmus.) *Zeitschrift für Augenheilkunde*, Mai, 1910.

(26) Kunst, J. J.—Atrophy of the optic nerve following contusion of the eyeball. (Sehnerven - Atrophie nach Kontusion des Bulbus.) *Centralbl. f. prak. Augenheilk.*, Juni, 1910.

(27) Penner.—A case of a rare injury to the eye by small shot without perforation of the globe. (Ein Fall von seltener Schrotschussverletzung des Auges ohne Perforation der Bulbushüllen.) *Zeitschrift für Augenheilkunde*, Juli, 1910.

(28) Kerry, Richard.—Notes on some cases of trauma of the eye. *Ophthalmology*, July, 1910.

(29) Koyle, F. H.—Repair of the cornea. *Ophthalmology*, July, 1910.

(30) Ballantyne, A. J.—Two cases of foreign body in the interior of the eye. *Glasgow Medical Journal*, August, 1910.

(31) Percival, Archibald Stanley.—Injuries to the eye. *British Medical Journal*, October 22nd, 1910.

(32) Stevenson, Edgar.—A remarkable case of injury to the eye. *Lancet*, October 22nd, 1910.

(33) Wildey, A. Gascoigne.—Notes on a case of the optic atrophy following supra-orbital injury. *Lancet*, November 5th, 1910.

(1) **Hirschberg,** of Berlin, reports three cases of eye injuries through blows with tennis balls. They all occurred in young people and in all three there was present, besides minor injuries, a rupture of the choroid which extended from the disc, through or near the macula, to the periphery. In all a central scotoma resulted, which was relative in one case and absolute in the other two. And in all three cases there was considerable improvement in the course of the following two or three years. Of the three eyes one was myopic, the other two were practically emmetropic.

A. Levy.

(2) **Gaupillat** and **Regnault** report rather a curious case.—A young soldier was struck in the eye with the end of a ramrod (*baguette écouville de fusil*) and immediately conceived the idea that he was blind for life and his career ruined. In spite of the facts that the wound was trivial, involving only the conjunctiva, and that the ophthalmoscopic appearances were normal, the patient developed a complete third nerve paralysis with all its usual symptoms, and was quite blind. Vision gradually returned and was associated with vertical hemianopsia: ocular movements returned more slowly, and the ptosis disappeared After two months the symptoms had all disappeared. The authors lean to the view that the case is hysterical, however unlikely that may be from the young man's constitution and antecedents; and one cannot help agreeing with them in this opinion.

Ernest Thomson.

(3) In a short lecture delivered at the Polyclinic, **Harman,** of London, illustrates, by means of a series of cases, most of the results which may follow blows upon the eye. In several of the cases the lens was more or less cataractous, and in one of these cases, that of a boy, aged 8, whose eye was bruised by an arrow from a toy pistol striking the lower lid, a small fan-like opacity at the back of the lens eventually cleared up. The liability to damage by slight blows of eyes suffering from angiosclerosis or from myopia is insisted upon. Ernest Thomson.

(4) **Chaillous** records the cases of two men who complained of indistinctness of vision following head injuries. On careful examination, the only defect found was a slight diplopia when wearing a coloured glass in front of one eye,

There was some difficulty in establishing the presence of double vision, which was most marked when the muscles were fatigued by prolonged testing or when the patient was told to look suddenly in the direction of action of the affected muscles. The author considers that in each instance the condition was due to paresis of the fourth and sixth nerves, and as the symptoms were still present in one of the patients seven months after the accident, he suggests that a guarded prognosis should be given in similar cases.

R. J. COULTER.

(5) **Beauvois**, of Neuilly-sur-Seine, gives statistics showing the large percentage of cases in which eyes have been rendered useless, from an occupational point of view, as the result of infected injuries of the cornea. He finds that septic complications are comparatively rare in cases which have received immediate and skilled attention, and he ascribes the bad results in ordinary cases to ineffective application of the remedies—which often have to be applied by the patient himself—to the squalid home surroundings of many of the patients, and to the clumsy and dirty manipulations of fellow workmen, chemists, or neighbours before they are seen by the ophthalmic surgeon. He advocates the use of emergency chests at the works, so that all cases of injury to the eye may be immediately bandaged up and then sent to an ophthalmic surgeon, who should take them into Hospital, so as to be sure that the remedies are properly applied and where the case can be watched under the most favourable hygienic conditions. Considering the money that insurance companies have to pay for compensation for impaired wage-earning capacity resulting from leucomata as the result of injuries, he is of opinion that it would be of great advantage to the employer or insurance company to get an early report on these cases and to insist on the treatment being properly applied. It would also pay them to contribute towards the "hospitalisation" of all cases of corneal injuries.

J. JAMESON EVANS.

(6) **Schenermann's** first case is that of a student who received a deep orbital wound in a duel. He immediately became comatose, and died in three hours without becoming conscious. *Post-mortem*, extensive tuberculous disease of lungs and pleura. It is supposed that the symptoms and the fatal ending were due to violent cerebral disturbance and severe shock occurring in an individual of exceptionally poor resisting power.

The second case is that of a child of three years who died of suppurative meningitis of the base fifteen days after a wound of the orbit with a pencil. *Post-mortem*, it was found that the orbital plate of the frontal bone was perforated. The appearances at the time of the accident were not such as to lead to the supposition of so serious an injury, and the pencil having been septic, it apparently had not been thought wise to use a probe. The pus was streptococcic.

ERNEST THOMSON.

(7) **Pfluz** (Düsseldorf) deals with the subject of neurasthenia, hypochrondriasis, and malingering, after injuries to the eye, especially in relation to Workmen's Compensation Acts. He says we should not encourage any exaggerated notions with regard to loss of working power after wounds of the eye. Most artizans can and do work as efficiently with one eye as with two. The visual power of each eye separately and of both together must be carefully tested during treatment, for simulation and malingering are rare at this stage. The patient must be encouraged to return to his work at the earliest possible moment, and he should not change his trade unless it be absolutely necessary. The most important part of the therapy of traumatic neurosis is prophylaxis.

T. HARRISON BUTLER.

(8) **Gendron's** patient had an injury to his left eye with a piece of steel

which wounded the cornea, iris, and lens. Under the usual treatment, the eye appeared to be doing well, but it suddenly became inflamed; at the same time the patient developed a febrile attack, with dry cough and suspicious sounds at the apices of the lungs. The general symptoms improved and the eye again became quiet but was soft. Subsequently, the patient developed osteomyelitis in the left tibia, and a week later, the injured eye again became inflamed and got gradually worse, so that it had to be enucleated. On examination of the eyeball, there was no sign of tubercle found, but there was a scar, 5 mm. or 6 mm. long, involving the retina, choroid, and sclera, which shewed that the piece of steel had passed through the eye into the orbit.

R. J. COULTER.

(9) **Kipp's** cases may be very briefly summarised.—(1) Penetration of lower lid and sclera with a pin which derived its impetus from the shaking of a tablecloth: infective iridocyclitis: treatment by solid atropin followed by dionine powder in five minutes, leeches: complete recovery. (2) Panophthalmitis following a perforating wound of cornea, iris, and lens, with a pin shaken out of a carpet. Treatment on ordinary lines. In connection with treatment, Kipp remarks:—"In many cases when suppuration was threatened I have also made subconjunctival injections of the cyanide of mercury in 1 to 5000 solutions, and of a 2 to 4 per cent. solution of chloride of sodium, but without apparent benefit. I still use them, in order that I may do everything that is known to have been of help in such cases. Mercury, given either in the form of inunction or by the mouth, has seemed to me to be of much value in threatened suppuration of eyes, and I usually give it if the salicylate of sodium fails to reduce the inflammation." (3) Rupture of the choroid and hæmorrhage in the retina following a blow in the eye. Choroid ruptured in lower region, probably by indirect violence (blow with a stone on outer part of eye.) Preservation of vision. (4) Lacerated wound of upper lid, conjunctiva, and sclera; ciliary body and choroid exposed. Conjunctival wound stitched. Recovery, corrected V. $\frac{6}{18}$. Five years later there was "a long non-depressed scar in the sclera, extending from near the outer margin of the cornea far back." No pigmentation of scar. Media normal. Ophthalmoscopically, a corresponding scar of choroid was seen. ERNEST THOMSON.

(10) The case of a railway labourer, aged 57, who was squeezed between a wall and a waggon. Beyond severe bruising, the man did not appear to be much hurt, and was able to walk, five days later, with the aid of crutches.

Examined by **Lassiguardie**, of Agen, some four months later, the following ocular signs were found.—Slight sinking of the left eye, unequal pupils due to marked contraction of the left, absence of pupillary reflexes to light, and pain, accommodation reflexes present, absence of (or very slight only) reaction to cocaine and atropine in the left eye (the right was not so examined).

In addition, the plantar reflexes were feeble, the patellar, cremasteric, and abdominal reflexes were absent, and there was some bladder trouble.

No history of previous eye trouble, alcoholism, or syphilis. The diagnosis of tabes due to trauma was made. BERNARD CRIDLAND.

(11) The scope of this paper by **Dutoit** (Burgdorf) is sufficiently described by the title. T. HARRISON BUTLER.

(12) **Van der Hoeve's** patient presented, after a very slight injury with a small branch of a tree, a condition very suggestive of a suppurating penetrating wound, there being discolouration of the iris and hypopyon. The greater part of the anterior chamber was occupied by a brownish mass, which at first could not be exactly diagnosed. In the free portion of the iris could be seen a few small nodules. From these the diagnosis of syphilis of the iris was made, and on further inquiry, this diagnosis was confirmed by the *anamnesis*. The slight

injury to the eye seemed to have played only a very unimportant *rôle*. The author thinks that his patient was already suffering from a gumma of the iris, which, at the moment of the injury, was already, for the greater part, degenerated into a pus-like mass, which only wanted a slight bruise to escape into the anterior chamber, where it took the appearance of an hypopyon. After a series of inunctions, the process healed, but the eye was seriously damaged as regards its functions. G. F. ROCHAT.

(13) Under this general title, **Mayou** (of London) gives the various causes of apparent aniridia following trauma, and, in particular, retraction of the iris into the angle of the anterior chamber by the organization of fibrous tissue on its surface. The causes of apparent aniridia are, incarceration of the iris in a scleral wound, avulsion of the iris, retroflexion of the iris, rupture of the ligamentum pectinatum, and retraction of the iris. The case-histories given in illustration should be read in the original. Three photomicrographs accompany the text. ERNEST THOMSON.

(14) This case by **Rutten** (of Liége) occurred in a miner affected with complete blindness of the left eye as the result of a blow upon the head. After the accident, consciousness was lost for a few moments only. There was but a slight wound of the left parietal region. The direct reflex of the pupil was lost, and at a later stage, the optic disc became atrophic. The chief interest of the case lies in the fact that the miner experienced difficulty in obtaining compensation, since the blindness was alleged to be the result not of an accident, but of disease. SYDNEY STEPHENSON.

(16) **Bennett's** patient, in removing her hat, drove one of the pins into her left eye from the nasal side, in such a way that it completely transfixed the cornea, the wounds of entrance and exit being near the nasal and temporal margins in the horizontal meridian. The pupil assumed a horizontally oval form, with a prolapse of the iris into each wound. The lens was not injured. The attachments of the iris to the cornea gave way under the use of atropine. A. J. BALLANTYNE.

(17) The patient was a boy, aged 14, who in falling struck his left eye against the stump of a projecting branch of a tree. The accident caused loss of consciousness and a wound of the lower eyelid. A week later, when seen, he could only count fingers on the temporal side, but the pupils reacted. The movements of the globe were normal. Hæmorrhages surrounded two-thirds of the disc. In the upper temporal quadrant of the disc there was a deep hole, extending in to the optic nerve, which was the ruptured lamina cribrosa. It is probable that the projecting branch stump penetrated the orbit beneath the globe, caught the optic nerve and forced it backwards. Two coloured plates are given, the second one representing the condition seen two months later, when the hole in the disc is seen to be filled in by fibrous tissue, and the appearance is very different from that shown when first seen. The vision did not improve. C. DEVEREUX MARSHALL.

(18) **Zazkin** (Berditschew, Russia), relates four interesting cases of injuries of the eye.—The first, the rare hæmorrhage into the cornea, occurred in a soldier whose eye had come against the taut rope of a tent. On the day of the accident there was seen a bright-red kidney-shaped spot of 1.5 mm. diameter in the central lamellae of the inferior portion of the cornea. Except for a superficial abrasion of the upper lid, there was no other sign of injury. The hæmorrhage was absorbed in ten days. The next case, a ring-shaped opacity of the lens resulted from a throw from a horse, the eye being struck by the saddle. Hyphæma prevented the condition being observed for a couple of days. The opacity disappeared in fourteen days (*v.* THE OPHTHALMOSCOPE, 1910, p. 34). A boy was brought with the complaint that blood flowed from

the eye after a fall upon muddy ground. Apart from a rupture of the tarsus of the upper lid involving the conjunctiva, the eye was uninjured. The last case reported by Zazkin was a cyst of the scleral conjunctiva of the size of a pea which followed an injury to the conjunctiva from the peck of a hen six weeks previously. Microscopically, the wall of the cyst consisted of fibrillary connective tissue. W. B. INGLIS POLLOCK.

(19) Under what seems a somewhat insufficient title, **Bérard**, of Angoulême, describes an interesting case of gunshot injuries. A gentleman when out shooting, received a blow on the eye from a No. 4 shot. Examination showed that there was irido-dialysis, hyphæma, conjunctival ecchymosis, a wound of the eyelid, but no perforation of the sclerotic or cornea. The intraocular blood gradually absorbed, and *pari passu* the tear of the iris became smaller and smaller until ultimately it disappeared, and left a perfectly normal and mobile pupil. The author desires to add this case to those of Wrekerkewich (also spelled "Wrekerich" in this article, and possibly meaning Wicherkiewicz E.T.), and another (author not named) reported in *La Clinique Ophtalmologique de Bordeaux*, September, 1909, which show that one may hope for a return to the normal in cases of traumatic irido-dialysis where the foreign body has not penetrated. ERNEST THOMSON.

(20) In the case reported by **Molesworth** (Dover) a vertical cleft of the iris, half an inch in length (traumatic), healed up under treatment with atropin, and became quite undiscoverable. ERNEST THOMSON.

(21) **Keiper**, of Lafayette, Ind., records the case of a man, aged 39 years, who apparently had his sclerotic ruptured with dislocation of the encapsuled lens subconjunctivally as a result of a blow on the eye with a cornstalk. The lens was left *in situ* and became absorbed in about three months' time. The wound in the sclerotic healed up, the blood in the eyeball became absorbed to a considerable degree, and the ultimate vision was $\frac{}{6\,0}$ with + 10 D.; tension normal. J. JAMESON EVANS.

(22) Salzmann defines evulsion of the optic nerve as "a forcible dislocation of the optic nerve from its scleral canal without breach of continuity of the neighbouring coats of the eye." It is a rare injury. Salzmann collected the record of seven cases: **Dalén**, of Lund, has found three or four more recent cases, and he describes a case of his own. The eye had been enucleated, and the histology is described and illustrated by two microphotographs printed on a special plate. T. HARRISON BUTLER.

(23) **Klein,** of Vienna, wishes to place on record a few cases of lens injury which present unusual features, and which he has collected in the course of a practice extending over many years (the earliest case dates from 1873). This case was that of a man, aged 36, who had a perforating wound of his cornea and lens, but without the lodgment of any foreign body. Traumatic cataract, with rapid swelling of the lens, followed. In the course of three months the whole lens was absorbed, and the pupil became black over its whole extent, and the V.=6/6. This was obtained without any operative interference whatsoever, and, in view of the man's age, must be regarded as a very extraordinary result.

Two other cases of a similar nature were the results of accidents during operation. Both patients were young, one aged 7, and the other 18, who, on account of corneal nebulæ and some symptoms of secondary glaucoma, required iridectomies. This was performed by means of a keratome, and on account of a sudden movement of the patient, the lens in both cases impaled itself on the keratome. Traumatic cataract followed, with complete absorption of the lens, leaving absolutely clear pupils.

In the year 1874, Klein was induced to attempt to operate for high

myopia. This was probably one of the very first cases in which such an operation was attempted. In view of the experimental nature of the operation, he desired to make as small an opening in the capsule as possible, and had a specially fine needle prepared for the purpose. The discission was performed, and on examining the eye next day, the lens was found to be perfectly clear, there was not even a small opacity at the point of entry of the needle; and so it remained, for before the operation could be repeated, the man had to be discharged from the hospital. In this connection Elschnig's case is equally remarkable. There, there was a double wound of the lens capsule, from which an iron foreign body had been removed by the magnet, and yet only slight opacities around the points of injury formed.

Klein also reports four cases of suspected injury to the lens when nothing happened. Three were cases of glaucoma in which the keratome on being pushed across the pupil passed behind the iris, so that the point lay between the iris and the lens—and nothing happened, the lens in all these cases remained absolutely clear. The fourth case was a paracentesis of the anterior chamber done in a young girl for embolism of the central artery of the retina. Here the same accident occurred, and the result was also the same, namely, the lens remained perfectly clear.

From these last four cases Klein is induced to draw the conclusion, that the ordinary teaching that the iris lies against the lens is wrong, for in that case the lens must have been wounded, and some, at least, of these cases would have shown some development of opacity. Many will consider this conclusion not quite justified.

Statistically, Klein operated, or assisted in operating, on some 2,100 iridectomies, and in this series seven cases suffered from wounds of the lens. Klein's own operations numbered 1,800, and of these, four wounds of the lens occurred, and all of them in glaucoma cases. Some of these might have been avoided by operating with a Graefe knife, but Klein always uses a keratome.

A. LEVY.

(24) **Erb** (Lugano).—In the first case a large pointed piece of steel entered the eye through a small scleral wound, which at once healed, leaving no visible trace. The piece of iron was hidden behind the ciliary body, and could not be seen with the ophthalmoscope. Vitreous haze, and ultimately a definite mass of exudate, appeared. The presence of a fragment of iron was at last suspected and the ring magnet used to extract it. The final result was good. The second case was one in which the posterior capsule was wounded by a piece of iron which lay in the lens. It was extracted by the ring magnet, and the lens did not become wholly cataractous, so that good vision was retained.

T. HARRISON BUTLER.

(25) **Dutoit** (Burgdorf) carefully describes four cases of surgical emphysema of the lids following blows upon the eye, and then discusses the support they give to the theories which Fuchs and Salus have advanced to account for the condition. Both Salus and Fuchs postulate a fracture of the *lamina papyracea*. Salus thinks it is a fracture by *contre-coup* caused by a blow upon the orbital margin. Fuchs thinks the fracture is due to a blow acting directly upon the globe, and by it transmitted to the bones of the orbit. The paper should be read in conjunction with that of Salus, which appeared in the *Zeitschrift*, 1908, Bd. XX, S. 342, and was abstracted in THE OPHTHALMOSCOPE. The author believes that both Salus and Fuchs are correct in their views. There are two chief varieties of the accident: direct orbital fracture and indirect. The two forms can coexist.

T. HARRISON BUTLER.

(26) **Kunst**, of Tjimahi, Java, records an important case of atrophy following contusion.—The patient, a young and healthy man, had a fall, and

hit his right eye against a reed about 4 cm. thick. He immediately had severe pain and diminution of vision. He was seen six hours after the accident, and then had much swollen lids and an abrasion on the lower one. The conjunctiva was also much swollen, and a small wound was seen in the lower fornix, where there was a sub-conjunctival hæmorrhage. Nothing indicated a perforation of the sclera, and the tension was normal. The eyeball was not protruded, and its movements were normal. The cornea perfectly clear, and the pupil reacted sluggishly. Ophthalmoscopically, the eye was perfectly normal, and remained so for a time, although the vision sank gradually. He was examined daily, and on the 19th day the disc began to look pale, and in a month the disc showed complete atrophy, and four months later the retinal vessels began to diminish in calibre. The author refers to the unsatisfactory state of the literature of the subject, the only reference he could find in any of the text-books occurring in De Wecker's *Traité* of 1889. A. LEVY.

(27) **Penner** (Königsberg).—A boy was struck in the eye by a small shot from a gun which perforated the lower lid and passed into the orbit, severely bruising the eye behind the equator. Ophthalmoscopically, *commotio retinæ* and a hæmorrhage were visible in the lower temporal quadrant. At first the vision remained normal. Skiagraphs showed that a pellet lay within, or close to, the sclera, and moved with the globe. The visual acuity fell to 5/8, and a tear of the retina became visible. One day, when the eye was strongly turned up, the shot was seen and extracted. After this, the eye completely recovered, and vision returned to normal. T. HARRISON BUTLER.

(28) **Kerry's** first case was one of blood staining of the cornea following a blow by a baseball. Iridodialysis was also present. After a lapse of fifteen months there was still blood staining in a small area at the centre of the cornea. The second case was also a contusion injury, resulting in effusion of blood between lens and vitreous. There was no fundus reflex but light projection was good. After a year or more, the fundus was visible and vision nearly normal. The third patient was troubled by light sensations in an eye which had been badly damaged by an explosion, and in which there was no light projection. These subjective sensations disappeared on removal of the eye. A. J. BALLANTYNE.

(29) **Koyle's** patient received an injury which tore away a large part of the cornea down to Descemet's membrane. The author describes the various procedures by which he finally succeeded in filling up the gap in the cornea. A. J. BALLANTYNE.

(30) **Ballantyne's** cases, in which a metallic body could be seen impacted in the retina, differed only in their duration. In both, efforts at removal by the large electro-magnet had failed. One case was recent ; the other of fifteen years' duration. In the latter, vision had failed in spite of transparent media, and a similar fate seemed likely for the recent case. ERNEST THOMSON.

(31) In this short article, **Percival**, of Newcastle-on-Tyne, only discusses a few of the most common injuries. After speaking about corneal and conjunctival foreign bodies, the author says : "If the foreign body has penetrated the eye, when magnetic it should be removed by a magnet. When not magnetic it must be seized by forceps through a suitable incision, and once seized, must never be let go until outside the eye. Should the opening be too small to allow its withdrawal, the scissors or knife must be used with the other hand, but the attention on the forceps must be maintained. Nothing will excuse the release of a foreign body that has once been grasped ; the opportunity of seizing it will probably never occur again until the eye is excised." One must suppose that such counsel is intended to apply to the removal of intraocular foreign bodies which are visible in the

anterior chamber after having penetrated the cornea, although, except by the context, this is not plain.

The author has been unable to obtain any comfort from books on the subject of the immediate removal of an injured eye *quâ* sympathetic ophthalmitis. He has formulated some simple rules which may here be given in full:

"The risk is extreme—(1) If the wound be in the *ciliary region:* this dangerous area may be defined as the zone $\frac{1}{4}$ inch in width that surrounds the margin of the cornea. (2) If the wound be *septic*: often this can only be recognised by its consequences; it should, however, be noted that wounds giving rise to suppurative panophthalmitis are not liable to induce sympathetic ophthalmia. (3) If a *foreign body be retained* in the eye, its removal being impossible. Immediate excision of the eye is indicated by the concurrence of two of these conditions, even though some sight be retained; by the occurrence of one of them if sight be irreparably lost, provided that the other eye be good, and that it shows no sign of iridocyclites. Under other circumstances excision of the eye may be delayed until symptoms arise without much risk, but operative interference is necessary when there is persistent, severe, or recurrent iritis, when the eye is tender or when it becomes soft, or when the other eye is the seat of sympathetic irritation."

Regarding septic central corneal ulcers, the author prefers pure carbolic acid applied by means of a wooden match, reserving the cautery for the obstinate cases.

Speaking of the difficult question of iris prolapse, Percival says that if seen within two hours, the use of atropin or eserine (according to the position of the prolapse) aided by the repositor, will usually cause replacement; but replacement is hopeless twelve hours after the injury. According to the text-books, the prolapse should be excised. With this the author does not agree. Excision will remove the tag, but will leave the lips of the corneal wound separated by the intruded iris stump, and a ready path is thus opened up for infection. His counsel is to leave the prolapse alone. Regarding the use of sugar in lime injuries, saccharate of calcium cannot be formed by the application of sugar solution to the eye. The remedy is to remove every particle of lime and employ some simple lotion, such as boric lotion. ERNEST THOMSON.

(32) **Edgar Stevenson,** of Liverpool, reports a remarkable case in which a thrush came bodily through the window of the cab of an express locomotive and struck the driver on the eye. There was a very small punctured wound of the sclerotic downwards and outwards, which the patient supposed was made by the bird's beak, but was really due, as Stevenson had surmised, to a splinter of glass. The wound was not interfered with, and eventually a fragment of glass was extruded. Stevenson remarks that this is the second occasion lately on which he has known of glass being extruded from the original wound by natural process. ERNEST THOMSON.

(33) Fleet-surgeon **Wildey** reports the case of a sailor who received a small contused wound over the right orbit as the result of a fall from a bicycle. On recovering conciousness, he complained of headache, and of complete loss of vision of the right eye. There was no injury to the eyeball, and no obvious sign of fracture of the skull. No proptosis. Ophthalmoscopic examination next day revealed no abnormal appearances, but in about a fortnight atrophic changes commenced in the disc. About this time the patient could dimly make out the largest letters of Snellen's types at one metre. "A perimeter chart, made about three weeks after the accident showed that such vision as existed" was limited to a very small central area confined to the nasal side in

the 40° circle. Within this area there was a central scotoma. The diagnosis was fracture of the sphenoid through the optic foramen, with lesion of the optic nerve. ERNEST THOMSON.

IX.—THE VISUAL EFFICIENCY OF INJURED WORKMEN.

Evans. J. Jameson.—The estimation of the visual efficiency of injured workmen. *Birmingham Medical Review*, October 1910.

Evans (Birmingham.)—In the estimation of visual efficiency the following factors must be considered :

1. The visual acuity for distance and near.
2. The presence or absence of binocular vision.
3. The extent of visual fields and the presence or absence of scotomata.
4. The condition of the ocular muscles—extrinsic and intrinsic.
5. Conditions of work.
6. The general—and especially the nervous—state of the patient.

As a rule, *visual acuity* is the most important factor in visual efficiency. Snellen's types should be used in all compensation cases. Illiterate types must be used when necessary. To circumvent malingerers, Evans has adopted the ingenious device of cutting up test types and pasting the letters on to a fresh card, arranging them at haphazard, so that the malingerer cannot make up his mind to read down to a certain line. This can be done both with the ordinary types and with the trident E in different positions. The top E=6/60 is best omitted. Reversed types, viewed in a mirror, are also of great use. Jaeger's or Snellen's types are employed for near vision. Any great discrepancy between near and far vision should lead us to suspect malingering.

Industrial vision may be considered normal if vision is not less than 6/12. It is generally held that if it falls below 6/60 the individual cannot earn his living. Evans thinks this standard is too high.

Roughly speaking, he takes the following as a guide as to the vision required in different trades ;—

(a) For skilled workmen (engineers, fitters, mechanics, jewellers, machinists, etc.) and members of learned professions ... ... $\frac{6}{8}$ to $\frac{6}{24}$

(b) For unskilled workmen (labourers, miners, quarrymen, carters, etc.) .. .. $\frac{6}{12}$ to $\frac{6}{60}$

In looking through a list of a few hundred patients who have attended the Birmingham Eye Hospital recently for various complaints which did not prevent them following their occupations, he found that the vision of those who were well able to follow skilled occupations was very often defective in one or both eyes. He mentions a few (errors of refraction corrected) :—

Blacksmith ...	R.V.=$\frac{6}{12}$	L.V. $\frac{6}{\cdot}$,	Aphakia in left eye.
Nut and Bolt Maker	R.V. =$\frac{6}{24}$	L.V.=$\frac{6}{24}$,	Glaucoma in each eye.
Engine-drivers ...	R.V.=$\frac{9}{6}$	L.V. $\frac{6}{60}$:	R.V.=$\frac{6}{6}$, L.V. $\frac{6}{36}$
Carpenter ..	R.V.=$\frac{6}{12}$	L.V. $\frac{6}{12}$	
Toolmaker ..	R.V. -$\frac{6}{24}$	L.V.=$\frac{6}{24}$	
Tailors ...	R.V.=$\frac{6}{60}$	L.V. $\frac{6}{12}$:	R.V.=$\frac{6}{18}$ L.V. $\frac{6}{18}$:
	R.V.=$\frac{6}{6}$	L.V. -$\frac{6}{60}$	L. Squint.
Brass-finisher .	R.V.	L.V.=$\frac{6}{36}$	
Chandelier Maker	R.V.=$\frac{6}{18}$	L.V. -$\frac{6}{12}$	Nystagmus.

Compositors ...	R.V.=$\frac{6}{12}$	L.V.=$\frac{6}{12}$: R.V.=$\frac{6}{18}$ L.V.=$\frac{6}{18}$
Bedstead Maker ...	R.V.=$\frac{6}{60}$	L.V.=$\frac{6}{12}$
Machinists ...	R.V. $\frac{6}{18}$	L.V. $\frac{6}{18}$: R.V.=$\frac{6}{24}$ L.V.=$\frac{6}{24}$
Fitters	R.V.=$\frac{6}{60}$ (Aphakia, etc.), L.V.=$\frac{6}{6}$: R.V.=$\frac{6}{6}$ L.V.=$\frac{6}{24}$ (Cataract).	
Electrician ...	R.V.=$\frac{6}{24}$	L.V.=$\frac{6}{18}$
Tram Driver ...	R.V.=$\frac{6}{18}$	L.V.=$\frac{6}{36}$ (Conical Cornea).
Needle Grinder ...	R.V.=$\frac{6}{12}$	L.V.=$\frac{6}{12}$
Cycle Polisher ...	R.V.=$\frac{6}{18}$	L.V.=$\frac{6}{18}$
Ironplate Worker...	R.V.=$\frac{6}{18}$	L.V.=$\frac{6}{24}$

Binocular Vision.—There are few objective tests. Wetz's prism test is the best. This causes diplopia and the necessary movement to effect fusion can be detected. There are many well-known subjective tests. Haselberg's types is useful. Rémy's diploscope and Harman's diaphragm test are of service. Roche's test is simple and demands no apparatus.

Pfalz's Stereoscopometer may be employed if the surgeon wishes to have a special instrument for the purpose. But a one-eyed man can be an excellent mechanic: binocular vision is not necessary in most trades. It is bad policy for a man to give up his work because he has lost an eye.

Visual Fields.—It is well before using the perimeter to make rough tests with the finger.

Slight diminution of the fields causes no reduction in the wage earning capacity. Homonymus hemianopia is more troublesome, and the reduction in the wage earning capacity may be estimated at as high a figure as 40%. But the nature of the work must be considered. Central scotomata are serious, especially in railway work.

The paper considers muscular defects, aphakia, and the conditions of work. It is a very valuable contribution to ophthalmic literature and should be carefully studied. T. HARRISON BUTLER.

X.—REMEDIES.

(1) **von Arlt, F. R.—The treatment of trachoma and of gonorrhœal diseases of the eye and of the urogenital system by preparations of Cupri Citras Solubilis: "Cusylol."** *Kal. f. Osterr. Amts- Gemeinde- u.f. Arzte*, 1911.

(2) **de Waele.—Upon the treatment of tobacco amblyopia by lecithine.** *Académie de Médecine*, Bruxelles, 28 janvier, 1911.

(3) **Marzorati.—Uranine as a means of diagnosis.** *Société Belge d'Ophtalmologie*, 14 mai, 1911.

(4) **de Ridder.—On the action of "Salvarsan" in sympathetic ophthalmia.** *Société Belge d'Ophtalmologie*, 14 mai, 1911.

(5) **de Waele.—On the treatment of tobacco amblyopia by lecithine.** *Société Belge d'Ophtalmologie*, 14 mai, 1911.

(1) Soluble copper citrate, or "Cusylol," is a compound of copper citrate and sodium boro-citrate recently prepared by **von Arlt,** of Vienna, in solid form. In the dry state it is said to contain about 14.9 per cent. of copper.

According to the author, it has bactericidal properties without caustic action. He recommends its use in various external diseases of the eye, particularly in trachoma and in ophthalmia neonatorum, due or not to gonococci. He employs the remedy in three forms:—(1) as a powder which contains "Cusylol" 20 per cent. and wheat meal 80 per cent.; (2) as collyria, 1/3 per cent. to 5 per cent.; and (3) as a 5 per cent. ointment. A special kind of "Cusylol" is used in the preparation of the ointment, since the other product has proved to be somewhat irritating. Glycerine ointment is the excipient.

SYDNEY STEPHENSON.

(2) **de Waele** has employed lecithine in cases of toxic amblyopia, with results superior to those obtained by other methods of treatment.

MARCEL DANIS.

(3) **Marzorati** presented to the Society three patients (affected with tuberculous iritis, irido-cyclitis, and hypopyon-ulcer) to whom had been administered two hours before the meeting six grammes of uranine. There was generalised icterus and a greenish colouration of the aqueous humour. He recalled the experiments made by Hamburger and Buerk, and reached the same conclusions as the writers in question, namely, that the drug produced no colouration of the media of a normal eye. His experiments had extended to thirty-five cases, among which there was an instance of sympathetic ophthalmia and two of traumatism accompanied by vitreous opacities, all of which presented, when treated with uranine, fluorescence of the vitreous humour. MARCEL DANIS.

(4) **de Ridder,** of Brussels, described the case of a patient affected with sympathetic ophthalmia who had been treated with subconjunctival injections and mercurial inunctions without result. One injection of 60 centigrammes of "Salvarsan," followed by subcutaneous injections of pilocarpine, caused clarification of the vitreous humour in a fortnight, as well as improvement in sight. The final result of the case was complete transparency of the vitreous and vision equal to 1/4. MARCEL DANIS.

(5) By the injection of lecithine in oily solution **de Waele,** of Ghent, endeavours to produce "disintoxication" of the nervous elements. Very encouraging results have been obtained. MARCEL DANIS.

BOOK NOTICES.

Précis d'Electrothérapie et de Radiothérapie oculaires. By Dr. A. LEPRINCE, of Bourges. Paris: Jules Rousset, 1911. Pages 316. Price 3 fr. 50.

In this volume the author has brought together under one title the different methods of employing electricity, electrical methods of examination of the eye, and the treatment of eye diseases by physical means. As stated in the title, and also in the preface, the book is a *précis*. It summarises what has been done, and enables one to see at a glance whether a certain form of treatment has been applied to the eye, and with what success. One may indeed regard it as a kind of review of the subject. While, in accordance with its avowed aim, the volume does not go deeply into the subject in general, the chapters on Radiumtherapy and on Radiotherapy are somewhat more fully developed than the rest. ERNEST THOMSON.

Hints for the General Practitioner in Rhinology and Laryngology. By Dr. Johann Fein, of Vienna. Translated by J. Bowring Horgan. London: Rebman Limited, 129, Shaftesbury Avenue, W.C. 1910. Price, 5s. net.

A few lines of commendation on a work on rhinology and laryngology which is likely to be of considerable service to ophthalmic surgeons. Dr. Fein describes only such methods of examination as can be readily applied. He holds (very sensibly, as it seems to us), that a limited but applicable knowledge of rhinoscopy and laryngoscopy is of much greater importance to the general practitioner of medicine than an extensive knowledge which he is unable to apply properly. In other words, he gives just such an account of his subjects as cannot but prove to be useful to ophthalmic surgeons in connection with diseases of the sinuses, and so forth. Sydney Stephenson.

CORRESPONDENCE.

While The Ophthalmoscope will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

A MISCELLANY OF SMALL CONTRIBUTIONS.

Dear Doctor Stephenson,

Doctor Maddox (The Ophthalmoscope, 1911, p. 99) might have given the honour of priority for the use of metallic mercury to your countryman, William Blizard (*Philosoph. Transact.*, Vol. LXX, 1780). S. *Geschichte der Augenheilkunde*, in Graefe-Saemisch, Bd. XIV, 2 Aufl., S. 38 u. S. 138.

Very truly yours,

J. Hirschberg, M.D.

Berlin,
26th June, 1911.

BIASTIGMATISM.

To the Editor of The Ophthalmoscope.

Sir,—In the review contained in your July number of an article by Professor Marquez on "Biastigmatism," the somewhat surprising suggestion is made that, in order to correct both the corneal and lental astigmatism when the axes of the two do not coincide, it is necessary to resort to two plano-cylindrical lenses cemented together, or possibly even to a lens having on one side a cylindrical, and on the other a toroidal surface.

It is a well-known fact that any two obliquely-crossed cylinders can be replaced by an equivalent sphero-cylinder (the simple rules for which transposition may be found in Silvanus Thompson's *Optical Tables and Data*, p. 75). In the case quoted the cylinders were —0.75 D. at 90°, and —1.0 D. at 105°. The exact equivalent of this combination is —0.02 D. Sph. c. —1.69 D. Cyl. axis 98°.5; but it will be seen that this is for all practical purposes equal to a plano-cyl. —1.75 D. (the nearest as spectacle-lenses are usually ground), as may be verified by actual neutralization. If retinoscopy had been resorted to in this case, it must have shown a regular astigmatism of this amount and at this axis.—Yours faithfully,

Chas. Hymans

7, St. Andrew's Street, Cambridge.
July 11th, 1911.

HARTRIDGE'S REFRACTION OF THE EYE.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

Every one who read the two previous letters (July) under this heading must have been somewhat amused.

(1) Although Mr. Ettles expressly says that a reference to other authorities than to Professor Nagel is "beside the mark," yet when I correct his misstatement of Nagel's definition of a metre angle in 1880, quoting chapter and verse of the original paper of that date, the reviewer refers to Tscherning to support him.

(2) I have pleasure in relieving Mr. Ettles of his fear that I do not understand the meaning of the term "equivalent lens." On such a point I quote an authority on the subject, not the authority of a technical electrician. "A thin lens of the same power as a given system of lenses will, if placed at the first unit point of the system, produce in any ray the same deviation as the system" (Herman). I use the term representative lens as I am not guilty of using a mathematical term in the wrong sense. As the eye does not consist of a succession of lenses in the same medium, there cannot be any equivalent lens to the ocular system. My illustration showed that Mr. Ettles' "equivalent lens" gave a faulty result in a simple little problem, whereas from the definition, an equivalent lens will give the correct results in every problem.

(3) If Mr. Ettles will read my annotation on "index myopia" a little more carefully he will see that my "intervention" was to show that, although he was correct in his conclusion that myopia was caused under the circumstances stated, his reason was wholly inconclusive.

The figures that Mr. Ettles quotes are those given by Tscherning in 1904. Since that time he has made new and more accurate measurements that he communicated to me in January 1910, and these may now be found in the *Encyclopédie française d'Ophtalmologie.*

It is unsafe to engage in a controversy on any subject without some knowledge of the work done by the authorities quoted.

Yours faithfully,

ARCHIBALD STANLEY PERCIVAL.

(This correspondence must now cease.—EDITOR.)

NOTES AND ECHOES.

Deaths.

THE death is announced from chronic nephritis of Gilbert H. Tollington, an ophthalmologist practising at Clear Water, Minnesota.

Floyd P. Sheldon, oculist and aurist to the Home for the Friendless, has died at New York from nephritis at the age of 53 years.

Arnett P. Austin, of Alice, Texas, has succumbed to cerebral hæmorrhage.

Edward W. Fox, of Trinidad, Colo., died on April 30th last.

The death is also announced at the age of 73 years, of Herny L. Shaw, consulting surgeon to the Massachusetts Charitable Eye and Ear Infirmary.

Harry J. Dean, of Mascatine, Iowa, is dead, aged 42 years.

The death has occurred, at the British Ophthalmic Hospital, Jerusalem, of William Charles Augustus Ward, at the age of 32. The deceased studied at St. Thomas's Hospital, where he held the post of ophthalmic house surgeon. Early deciding to specialise in ophthalmology, he obtained the appointment of senior house surgeon at the Royal London Ophthalmic Hospital, and was subsequently appointed ophthalmic inspector for the Public Health Department, Egypt. By his untimely death a career full of promise has been cut short.

We regret to announce the death of Thomas Law Webb, aged 64, of Iron-Bridge, Salop, which has occurred at Weston-super-Mare. The deceased, who was educated at Sydney and at Queen's College, Birmingham, qualified as M.R.C.S.Eng. in 1870, taking the L.R.C.P.Lond. two years later. He obtained the M.B., B.Ch.Birm. in 1901, and the M.D.Birm. in 1903. Dr. Webb had held the appointment of honorary pathologist to the Salop Infirmary and to the Eye, Ear, and Throat Hospital, Shrewsbury.

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Appointments and Honours.

Dr. K. Hess, of Würzburg, has been nominated an honorary member of the Belgian Ophthamological Society.

Dr. W. C. Posey, of Philadelphia, has been appointed consulting ophthalmologist to the Hospital for the Chronic Insane of Pennsylvania.

Dr. Richard A. Reeve has been elected vice-president and Dr. Charles Trow, chairman of the section of ophthalmology of the Toronto Academy of Medicine.

* * * *

A New Academy.

ST. PAUL and Minneapolis specialists have recently organised the Minnesota Academy of Ophthalmology and Oto-Laryngology, with Dr. H. M. Morton as president, Dr. J. F. Fulton and Dr. T. McDavitt as vice-presidents, and Dr. E. H. Parker as secretary and treasurer.

* * * *

A French Committee upon Lighting.

THE French Minister of the Interior has recently nominated a technical committee for the purpose of enquiring into and reporting on lighting, natural and artificial. Its members represent many interests. Thus, ophthalmologists include Drs. Morax, Chevallereau, Cosse, and Motais. Physics is represented by MM. Gariel and Broca. Engineering and lighting have MM. de Tavernier, Seguin, Delage, and Lamiraud. The reference to the committee covers wide ground, and includes the most practical means of measuring luminous intensity, the determination of the minimum artificial lighting compatible with normal sight, the relationship between myopia and blindness, and the best means of preventing short sight.

* * * *

The Spectacle Makers' Company.

THE lessons of the Markham *v.* Abrahams case have not been lost upon the Spectacle Makers' Company, one of the two public bodies that issues diplomas to opticians. The Master, Wardens, and Court of Assistants of that ancient and honourable City company announce that a policy of assurance has been taken out by the Company to cover the trade risks of its diplomates for

a period of six months. All claims, however, will be subject to the decision of the Court of Assistants, an arrangement that recalls that of the Medical Defence Union and of the London and Counties Medical Protection Society, which take up cases only when approved by their respective Councils. We understand that the remaining certifying body, the British Optical Association, issues assurance policies to its diplomates at an almost nominal charge. As matters stand after the recent legal decision, unassured opticians are only too likely to find themselves in no enviable position. Assurance would appear to be the only way out of the difficulty.

* * * *

Samuel Pepys, F.R.S.

THAT accomplished scholar and surgeon, Mr. D'Arcy Power recently delivered an address on "Why Samuel Pepys discontinued his Diary," before the members of the Samuel Pepys Club in London. It is well known to all students of literature that the famous *Diary* came to a premature end on account of the condition of Pepys' eyes. His pathetic words, penned under date May 31st, 1669, will recur to everybody: "And thus ends," he wrote, "all that I doubt I shall ever be able to do with my own eyes in the keeping of my Journal, I being not able to do it any longer, having done now so long as to undo my eyes almost every time that I take a pen in my hand; and, therefore, whatever comes of it, I must forbear." . . . "And so I betake myself to that course, which is almost as much as to see myself go into my grave; for which, and all the discomforts that will accompany my being blind, the good God prepare me." Mr. Power traces the diverse entries made by Pepys concerning his sight, including one which describes his visit in 1667 to Turlington, "the great spectacle maker," for advice about his eyes. The advice given by that worthy is stigmatised by Mr. Power as "superlatively bad," although it is a little difficult to understand on what grounds. The conclusion of the whole matter is that Pepys was suffering from eye-strain as the result of uncorrected hyperopic astigmatism, and that his fear of becoming blind was without foundation in fact.

* * * *

Liverpool Diploma in Ophthalmology.

THE action of the University of Oxford in instituting a diploma in ophthalmology has recently been followed by the Council of the University of Liverpool, on the recommendation of the Senate and the Faculty of Medicine. Candidates for the diploma in ophthalmic surgery must possess a qualification in medicine entitling to registration in the United Kingdom. They must also attend (1) a three months' course of study in the University of Liverpool upon the anatomy, physiology, and pathology of the eye; and (2) a course of instruction in a recognised ophthalmic clinic extending over not less than three terms. The subjects of the examination, which will be held twice a year, at the end of the summer and autumn terms, are: (1) The anatomy and histology of the visual organs and centres; (2) the physiology of vision; (3) physiological optics; (4) bacteriology in relation to diseases of the eye; (5) the morbid anatomy of diseases of the eye; (6) the diagnosis and treatment of diseases of the eye; (7) the estimation and correction of errors of refraction. The fee for the examination is £5 5s.; for each subsequent examination £3 3s.

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Ophthalmology in America.

MEANWHILE, the need for additional instruction in ophthalmology in American schools and universities has been voiced by Dr. Edward Jackson, of Denver. Dr. Jackson persuaded the Colorado Ophthalmological Society at a recent meeting unanimously to pass certain resolutions bearing upon the subject. The first resolution affirmed that a proper preparation for eye work called for the study of certain subjects not now demanded of a candidate for the degree of doctor of medicine. The second resolution was to the effect that no complete and systematic course of instruction in ophthalmology was at present offered in America. The last resolution called upon the University of Colorado to establish a course in ophthalmology requiring (*a*) graduation in medicine; (*b*) the study of physical and of physiological optics; and (*c*) one year of post-graduate work in ophthalmic science and practice.

* * *

A Recent Case.

WE seem to trace the re-echo of a recent case, of which the opticians made a good deal at the time, in the following pithy extract from the annual report (1910, p. 10) of the London and Counties Medical Protection Society, Limited :—

"A member published a letter suggesting that opticians might profitably devote more care to matters within their own province instead of encroaching on that of medical men. He gave an example of alleged blundering on the part of an optician. In consequence of this the secretary of a society challenged him to give the name of the optician to whom he referred. The member was advised in regard to his reply to this challenge."

* * * *

Col. H. Smith.

THE obvious sincerity of the following letter by Dr. Nevin D. Pontius, of Seattle, published in the June issue of the *Ophthalmic Record*, prompts its publication in the columns of THE OPHTHALMOSCOPE. It seems to be an important contribution to the ethics of the vexed question of the so-called "Smith operation":

To the Editors of "The Ophthalmic Record."—

Indulgence in personalities in what should be purely a professional matter is always to be deplored. In an article in the April number of THE OPHTHALMIC RECORD, Col. Smith, in order to explain some unfortunate results following his method of extraction, attributed to me an utterly unwarranted personal ill feeling

It is quite true that I went to Jullunder unexpectedly and without prior correspondence. It is equally true that Major Smith made me welcome and, what was more than I had any right to expect, allowed me to operate on some twenty-five cases under his direction, with all of which I was very pleased, but I did not understand that I would be expected to misrepresent facts, in favour of his method, after my return home.

At a meeting of the Washington State Medical Society, Dr. Würdemann read a paper on the intracapsular extraction of cataract. Having so recently visited Jullunder I was expected to discuss the paper. One of the three courses was open to me; I could refuse to tell what I had seen, I could politely prevaricate, or I could tell what I believed to be truth. Not being one of those who "bend the cringing knee that thrift may follow fawning," I did the last.

That Major Kilkelly would degrade himself to the extent of showing cases other than those that Major Smith had operated upon is not conceivable. Neither is it to be inferred that all of Col. Smith's extractions

turn out as unfortunately as did the Bombay cases. It simply shows that a rather high percentage of Col. Smith's cases do have unfortunate accidents and I am quite sure the percentage of them is higher than Col. Smith himself is aware. I doubt very much if any man who has visited Jullunder believes that Col. Smith himself knows the extent of his unfortunate cases. As an example I saw him extract, by the intracapsular method, a lens from a myopic youth, when, according to his own admission, he did not know in advance the condition of the vitreous or the amount of the myopia. That it was a highly risky thing to do was proved by the perspiration which came to the operator's brow while he was exerting what would have been apparent to the merest novice as unwarrantable pressure. As to the facilities for examining cases, of which he speaks, it is true that *every facility for seeing operations* was granted, but I was never invited to see cases *after* operation. However, on two occassions I reluctantly and with a feeling of intrusion, made morning rounds with his native assistant. I was not shown as many cases as had been operated on and even these were exhibited in small, semi-dark rooms without any of the artificial aids to examination.

During my ten days' stay I saw no case examined with an ophthalmoscope or by lateral illumination; neither did I see one case whose refraction had been worked out. My inference was that, the average patient (peasant) left the hospital at the end of about a week without being thus examined and returned to the country from which most of the patients come. The artisans no doubt remained, or returned for glasses, but if the refraction of any considerable number of patients operated on were subsequently determined, it is quite likely I would have seen at least one of them during my ten days' stay. On one occasion a patient, who had been previously operated upon by Major Smith, appeared at the clinic, presenting clear pupillary areas. Without any examination other than that he made at the doorway he unhesitatingly asserted that this patient would have 6/5 vision! By what occult power any surgeon can say, after mere inspection and without further examination, what vision an eye possesses is beyond my comprehension.

I have no doubt Col. Smith regrets greatly that he permitted me to operate on some twenty-five cases, but his regret is no greater than mine at having visited Jullunder. I was not disgruntled, as he says; on the contrary, I felt greatly obliged for his hospitality, and left Jullunder in time to have some three days in Bombay before my ship sailed.

These unfortunate bickerings have no real value in determining the status of the operation. The truth of the matter is the intracapsular operation is not done by the men for whom we have the greatest respect as surgeons. For Col. Smith to intimate that there is or was a conspiracy in London against him is ridiculous. Furthermore, I do not believe that Doctors Greene and Vail will be doing this operation on *private patients* two years hence, notwithstanding all that they have said about it since their return from Jullunder.

A prudent person must inevitably agree with Dr. Risley that "a man with Smith's opportunity and dexterity would get good results by a number of different methods." But the contention that the operation is suitable for other cases than double immature cataract where the patient can not afford to wait for maturity, will not, I am sure, find favour with the men of best judgment.

In conclusion I wish to pay my highest respects to Col. Smith *as an operator*. I nevertheless believe that he is simply stubborn in his

insistence upon the merits of intracapsular extraction as a routine measure. The situation was rather neatly expressed when Mr. Treacher Collins said to me, "you need that posterior capsule to support the vitreous."

NEVIN D. PONTIUS.

COBB BUILDINGS,
SEATTLE, WASH.

* * * *

The Diploma of the British Optical Association.

IT is almost impossible to withhold sympathy and even a certain degree of admiration from the writer of the following communication, an unsuccessful candidate for a recent examination held for the diploma of the British Optical Association. At the same time the extraordinary command of the English language shown by the disappointed candidate makes it clear that he is scarcely fitted to be admitted to the diploma in question:

"SIR—Very sorry indeed to find in the *Bulletin* received this day to have been unsuccessful, for the second time, and yet the examiners and officials were exceedingly nice and civil with candidates, in my opinion, yet such poor results! Although I have had 12 years of sight-testing, and had several years of personal private tuition and served under very nice teachers of high degree, yet I find my ambition no nearer, although my knowledge no less, and as I am now — years of age, only sorry I did not enter younger. Being so interested in the B. O. Association, although not a member, I have always, and will maintain its honour and place in this country of which I am proud to belong. Having tested hundreds of cases comprising of doctors, clergymen, councillors, people of different ranks, and no one better known in the locality, and giving satisfaction—yet there is something lacking, I know, yet I am again one of the poor fellows gone down, although discouraging, yet I am not down-hearted. It clearly proves to anyone, especially those who look down on the B.O.A., that the exams. are keen and not as easy as they would have us to believe, and I feel it more now as I grow older, as we all do, the importance of being fully competent in our work, and from previous reports in your weekly *Bulletin* that next year the exams. are to be more keener than ever, and I am afraid, although I say with regret, it will seem impossible for us men who are getting on in years to ever become possessed of a certificate entitling us to be a member of the B.O.A. Your knowledge is fine, and experience wide, and if we could, as you state, grasp the real facts, then the results of the examinations would be better. I really and fully believed I should have nicely managed this time, but owing to things done unknown, as is generally the case, and not done things we ought to have done!" —H. W.—*The Optical Bulletin*, June 30th, 1911.

* * * *

The notification of Ophthalmia Neonatorum.

INFANTILE ophthalmia has been added to the list of maladies scheduled under the Infectious Diseases (Notification) Act, 1889, by Birmingham and by Glasgow. In the case of Glasgow, Dr. A. K. Chalmers, the medical officer of health, advised the measure to be adopted for three years only, in order to ascertain its value. One or more nurses are to be engaged to supervise the cases brought to light by notification in Glasgow, which, by the way, is the first city in Scotland to adopt the provisions of the Act.

* * * *

A Contrast.

THERE could hardly be a greater contrast than between the surroundings of the British and those of the American ophthalmic surgeon. The Britisher receives his clients in the quiet respectability of a private house, situated in a dull but fashionable part of town. His door-plate is small, and beyond his name, bears no indication of his occupation. Qualifications are taboo. Every trace of "shop" is most carefully eliminated from his environment.

To all this the surroundings of some of our brethren in the Western States of America form an instructive, nay, startling contrast. Take for example,

the case of a prominent Chicago ophthalmic surgeon, whose name is known the world over. This gentleman is in partnership with five other practitioners, of whom two devote their attention to the eye, two to the ear and the throat, and one occupies the position of an assistant. The firm occupies a flat on the twelfth floor of a "sky-scraper" in the throbbing heart of the city. The flat has upwards of thirteen rooms, comprising some 2,800 feet of floor space. Two lifts ("elevators" in American parlance) are continually working from the basement to the fifteen floors of this mammoth building. Five females are employed at salaries of sixty dollars a month, a number that includes a nurse, a stenographer, a book-keeper, a reception room attendant, and a private secretary. One of the rooms is occupied by a graduate druggist, who dispenses the medicine prescribed by members of the firm, and another by an optician, who fills their orders for glasses. The reception room, with its clanging telephones and ticking typewriters and general air of business, is a veritable hive of industry. The name and address of every patient are written on a card by the attendant and sent in to the office of the particular medical man concerned. The place is excellently equipped for its purpose, electrical apparatus being an especially strong feature. Minor operations, not requiring a general anæsthetic, are undertaken in the well arranged and carefully fitted operating theatre. Hours are from 10 a.m. to 4 p.m., with one hour off for lunch. Fees range from a minimum of one dollar to a maximum of ten dollars, according to the circumstances of the patient. Business is conducted mainly on the credit system. What is probably the best private ophthalmological library in America is to be found on the premises, which also serve as the publishing office of a periodical devoted to eye work.

The system outlined above appears to be spreading in the Western States and has already invaded some parts of Canada. It would, however, almost certainly be impossible of accomplishment in the Eastern States of America or in this country, even supposing it to be desirable.

* * * *

The Howe Prize.

THE Lucien Howe Prize for advances in ophthalmic medicine or surgery has been won by Dr. Homer E. Smith, of Norwich, N.Y., for his essay on "An Improved Method for the Extraction of the Immature Cataractous Lens."

* * * *

American Association for the Conservation of Vision.

WE have been favoured with copies of the *Bulletin of the American Association for the Conservation of Vision*, Vol. 1, No. 1, and of the first number of the Monograph Series of the same Association.

In an accompanying circular it is stated that the Association is the outgrowth of a movement which had its origin in a desire to prevent blindness from infectious disease, and which gradually developed and extended its purpose until it included the prevention of all causes of impared vision. It will be seen that the Association has opened a large field for its activities. The first number of the *Bulletin* is a general one, entitled "Conserving Vision." It deals at large with ocular hygiene, illumination, structural defects of the eye, accidents and diseases of the eye; in all cases from a prophylactic standpoint. The first number of the Monograph Series deals with ophthalmia neonatorum in ten Massachusetts cities. It is largely statistical. The differences between the conditions of medical practice on

this and the other side of the water being such as they are, and such, indeed, as they are revealed to be in this article, we shall excuse ourselves from investigation of these statistics. Suffice it to say that the author, Henry C. Green, does not spare the lash in his references to a large number of American practitioners. Here is an example:—"Out of 61 registered physicians in eight cities, each of whom was confronted at least once during 1909 by a case of ophthalmia neonatorum, 39, or over 64 per cent., neither asked at any time for expert help, nor yet transferred their cases to any hospital, but invariably tried their inexpert hands at restraining the disease which they had failed to prevent. . . . . In one way or the other, they treated 44 gonorrhœal or probably gonorrhœal cases; and they saved on an average nearly one baby's eyes (*sic*) apiece. . . . ."

After discussing the prevalence, the causes, the prevention, and the cure of ophthalmia neonatorum—which subjects occupy the first 36 pages of the monograph—the author tackles the question "What Next?" First of all, he answers, the instillation of knowledge into people in general. "With the effect of gonorrhœa on other organs than the eye thus made known to the average man and woman, parental flippancy may be cauterized in time to save the sight of many children." Secondly, full and complete birth returns with notification of both gonorrhœal and non-gonorrhœal cases. "But the main problem of prevention," says our author, "is a problem of doctors. The careless among these must be persuaded if possible. But persuasion alone cannot avail. If a physician, knowing that infection is very frequently present, chooses to risk the child's eyes, well and good. Let him make his calculation, and if the risks seem small, let him take them. But let him take them not for the child alone, but in some measure for himself. If the child goes blind, let the physician run some risk more deterrent for the future than the risk of mere regret. . . . . Is it not practical to provide some stronger reminder?" We cannot think that words like these would have been penned, or would be justifiable if they had been penned, by any British investigator of British conditions. As regards midwives – and here again there are opinions which sound strange to British ears – the author says: "In the face of the midwife habit of so many of our immigrants prosecution cannot suppress. What the facts demand is recognition first, and then discrimination. Midwives exist. No fiat of the law can at once destroy them. This fact must first be recognised. But the best of these women, as candid doctors aver, are preferable by far to the least skilled registered physcians."

Here are some of the concluding words of this remarkable article, the writer of which seems to castigate the physician, the midwife, and the public with almost equal impartiality: "Vigorous warnings are still imperative, both for the doctors and for the public. Both are still at ease in their fool's paradise. A typical practitioner states that, in five years of practice, including 83 maternity cases, he has just met with his first case of ophthalmia neonatorum. He does not dream the truth, that his one case in 83 means that if he could monopolize the obstetric work of his small city, he would probably be responsible each year for some thirty children in danger, and some two or three helplessly blind. . . . As for the public, even the few who know of this disease and its menace, fail to demand, if they do not in their own families oppose, the preventive treatment which might well be universal. This failure is the public's share in the unconscious conspiracy of neglect which condemns many children to blindness."

THE

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ORIGINAL COMMUNICATIONS.

THE RELATION OF THE TRACHOMA BODIES TO TRACHOMA, WITH A REPORT OF CASES.*

BY

S. HANFORD MCKEE, B.A., M.D.,

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PROGRESS in diagnosis in diseases of the conjunctiva has been marked during the last few years, thanks to the help of ophthalmic bacteriology. In spite of that, trachoma in some forms seems as difficult of diagnosis to-day as it was many years ago. One does not refer to the typical case, with pannus and scar formation, but to the condition of ophthalmia where the palpebral conjunctiva is found thickened, succulent, and granular, conditions all of which are accentuated in the retrotarsal folds. Papillary hypertrophy is by no means limited to trachoma. The hypertrophied follicles are the result of the reaction of the conjunctiva to continued irritation, whether that be caused by micro-organisms, or by physical, mechanical, or chemical means. Many of these forms are not contagious, and are in but slight degree related to trachoma.

The diplo-bacillus of Morax-Axenfeld is able to set up a clinical condition identical, as far as the conjunctiva is concerned, with trachoma. Likewise, the pneumococcus sometimes gives a picture similar to the acute form. The relation between gonococcus infection and trachoma may be closer than we think. As Axenfeld has said, "the sequence in many cases is striking." Who cannot recall cases of ophthalmia where the secretion was examined for the gonococcus and where only the subsidence of the discharge, and the appearance of the granular condition, lead to the proper diagnosis. We have all seen the granulations in the retrotarsal folds in cases of gonorrhœal ophthalmia of some days standing, and noted the similarity to trachoma. These references suffice to emphasize the first point I wish to bring out, namely, that in certain cases, in spite of the bacteriological advantages of to-day, the subsequent course of the disease alone affords us the desired information.

The discovery of the cause of trachoma will give us the means of differentiation. That alone will put diagnosis on a definite basis, and settle the old question of trachoma *v.* follicular conjunctivitis.

The discovery of the ætiological factor of trachoma has been reported more than once. Generally, these announcements have represented "wild flights of the investigators." Not so with the report of Halberstädter and v. Prowazek, who in 1907 described inclusions which they had observed in the epithelial cells of the conjunctiva. After staining with Giemsa the smear preparations from a trachoma patient, they found, near the nuclei of the epithelial cells, round or oval, dark-blue or violet, non-homogeneous masses. Within these bodies they discovered very sharply defined small granules of a distinctly red colour. They also noted irregular masses of blue stain, the reaction product of the cell-plastin clots. Halberstädter and v. Prowazek believed these small bodies parasites because :

1. They were always found in the same characteristic way ;

* Read before the American Academy of Ophthalmology and Oto-Laryngology, Cincinnati, September 20th, 1910.

2. Inoculation on to the conjunctivæ of the orang-outang infected it, with the production of these bodies in the epithelial cells, and transference from orang-outang to orang-outang was possible.

They suggested the name "Chlamydozoa." Their findings have been verified from many quarters. In this country, Pusey of Chicago, Verhoeff of Boston, and myself, have demonstrated the cell inclusions in trachoma.

There is no doubt that the Halberstädter and v. Prowazek bodies are constant in all cases of fresh trachoma. Are they present in conditions other than trachoma? Before proceeding to the examination of the diseased conjunctiva, Herford examined 100 films of non-trachomatous cases with negative results. Stargardt reported having seen the bodies in one case of non-bacterial ophthalmia neonatorum; Lodato, in cases of spring catarrh; and Stanculeanu, in chalazion.

Heyman, in his study as to their specificity, reported that of nine positive cases, five were from acute trachoma and four from gonorrhœal ophthalmia neonatorum. In these four cases the gonorrhœal nature of the disease was established and the possibility of infection with trachoma excluded. The bodies were so typical that experienced microscopists were unable to differentiate the inclusions seen in the ophthalmia neonatorum cases from those supposedly typical of trachoma. He therefore concluded that it was impossible to declare the v. Prowazek bodies as specific for trachoma, and that their presence was of no value in diagnosis, unless every suspicion of gonorrhœa was removed.

Later, Flemming, among 32 cases of infantile conjunctivitis observed for some months, found the trachoma bodies in 12. He also demonstrated these inclusions from a case of gonorrhœal conjunctivitis in an adult.

Wolfrum examined 28 cases of gonorrhœal ophthalmia and obtained negative results. Of eight cases of catarrhal conjunctivitis of the new-born, four had inclusions. Secretion inoculated into an adult's conjunctiva was one week later followed by follicles, and after nine days, typical inclusions were found in the smear. The further course of the case was that of genuine trachoma. From these observations Wolfrum concluded that Heyman's findings were from mixed infections of trachoma and gonorrhœa, and that his own cases of catarrhal inflammation were trachoma of the new-born, presenting a very different clinical picture from trachoma in the adult.

Lindner and Hofstätter found trachoma bodies from the vaginal mucous membrane, while Lindner and Fritch demonstrated them from the inflamed male urethra.

Halberstädter and v. Prowazek, following Heyman's report, made similar examinations with regard to infantile ophthalmia. They concluded that there was a large group of non-gonorrhœal ophthalmia characterised by the presence of chlamydozoa where the infection took place *intra-partum*, which they looked upon as a special infectious disease—"Chlamydozoa blennorrhœa." They also found bodies in the genito-urinary tract of some of the mothers, and also in the urethra of males suffering from a non-gonorrhœal inflammation. In a former report they stated that they believed the chlamydozoa of ophthalmia were in morphology identical with those of trachoma, but that the two might be differentiated biologically. As Lindner and others have since produced typical experimental trachoma with vaginal secretions, they now believe that the origin of trachoma is derived from the epithelium of the genital sphere, and support Lindner's view that the diseases of the conjunctiva, male urethra, and female genitals, are caused by one and the same virus.

Heyman, continuing his researches, states that he has found the trachoma bodies only in trachoma, in infantile conjunctivitis, and in a suspicious

conjunctivitis in an adult female. He often found the bodies and the gonococci in the same preparation. In 15 cases of fresh trachoma the bodies were found in 10; in 15 cases of relapses the inclusions were found three times; while in 23 cases of old trachoma no bodies were found. Of 43 cases of infantile conjunctivitis 14 were pure gonorrhœal inflammations, 10 were inclusion conjunctivitis with no pathogenic organisms, while 12 were *mixed* blennorrhœas. In 15 examinations of the inflamed urethra in men and women the trachoma bodies were found in two, while in controls the examination was negative. Heyman offers nothing new as to the nature of these inclusions, but states that he believes the bodies point to the presence of a virus which is transmissible to apes, and to which the eyes of the new-born are very susceptible.

During the past few months I have made upwards of 150 examinations at the Montreal General Hospital. The smears may be prepared, fixed, and stained within one hour, making the examination in an out-patient department practicable. I have had negative results in:

3 cases of active trachoma,
13 cases of old trachoma with scar formation,
60 cases of catarrhal conjunctivitis,
28 normal eyes,
5 cases of gonorrhœal ophthalmia neonatorum,
11 inflamed tonsils,
5 from the vaginal mucous membrane.

The trachoma bodies were found in:

14 cases of active trachoma,
1 case of catarrhal conjunctivitis (pneumococcus) in an infant of ten days,
2 cases of purulent conjunctivitis, in babies of two weeks,
2 infants with no conjunctivitis, and
1 adult male with no conjunctivitis.

It will be noted that in three cases of active trachoma we had negative results in the smear preparations. To show that the bodies may be present in the conjunctiva and missed in the smears, I may say that in one of these cases, examined every day for a week, no bodies were found, but were later demonstrated in the tissue preparations. A striking result of my examinations was the finding of the trachoma bodies in the normal conjunctiva. That has been reported, and need not be dwelt upon here, except to say that since that report another such case in an infant has been observed. Of the positive results, one of great interest to me was as follows.—A baby of two weeks was brought to the out-patient department of the Montreal General Hospital some three weeks ago. It had a purulent conjunctivitis of four days' standing. Smear examination was negative, while culture showed the presence of the staphylococcus pyogenes albus and the bacillus xerosis. To verify the reports of others on infantile conjunctivitis, prepared smears were stained with Giemsa. The epithelial cells were crowded (in many cases the cytoplasm of the cells was broken) by masses of trachoma bodies. The whole microscopic picture was a much more exaggerated one than I had ever seen in the most virulent cases of trachoma.

The Halberstädter and v. Prowazek trachoma bodies have been found by numerous observers in trachoma, in ophthalmia neonatorum, gonorrhœal and abacterial, by a few in catarrhal and purulent conjunctivitis of infants, and by myself in the normal eye. They have repeatedly been demonstrated in the male and female genital organs, to such an extent, in fact, that Herzog would have us believe that gonococci involuted or changed in some other way are the

producers of a disease as severe as true trachoma. What the trachoma bodies are, only further unbiassed research may show. In the light of our present knowledge do they not seem to represent more the reaction of these different mucous membranes to some virus, rather than the ætiological factor in trachoma? "For the present we must consider it doubtful whether these granules are parasitic in nature or not, and further research is necessary before we can say whether they occur so regularly in trachoma that they can be considered of diagnostic value." This remark was penned by Axenfeld in 1908. It seems to me that 1910 finds the question in *statu quo*.

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THE TREATMENT OF TRACHOMA.

BY

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In July, 1887, I read before the Griqualand West Medical Association a communication on the "Treatment of Trachoma." This paper was published in the *South African Medical Record* of January, 1888. In this paper I recommended a new form of treatment. Having since that time had great success with the method I am encouraged to bring it again to the notice of the profession. I am the more inclined to do this as I see in some of the later works on eye disease sulphate of copper is still recommended as the best application in this affection.

Sulphate of copper I have found useful only in papillary granulations. It is a very painful application, and, as shown by Sydney Stephenson*, is liable to produce a characteristic opacity of the cornea if its use is long continued ; and it is only by persevering use of any form of treatment that we can hope to cure trachoma.

My method of treating trachoma is as follows :—

After washing out the conjunctival sac with boric acid solution and instilling a drop of coca-renaline, I carefully prick the true granulations with a tattooing needle dipped in acetic acid (acid acet. fort. i. to water ij.), and then

* Stephenson.—*Trans. Ophthalmological Society U.K.*, Vol. XXIII, p. 25.

wash again with boric acid solution. Lately, I have applied a 25 per cent. solution of argyrol with a smooth glass rod after pricking, as it seemed to relieve any irritation.

This treatment, if a weak solution of cocaine is used before pricking, is practically painless, as the true granulations are insensitive and soft; and so it can easily be used with children, who form a large proportion of the cases here. I am in the habit of pricking the granulations every third or fourth day, but the irritation caused by the pricking is so slight that it might be done every second day.

During the treatment I also order for home use a lotion of cyanide of mercury, 1-4,000, to be used freely twice daily. As a rule, I find that the papillary granulations subside as the true granulations disappear. If not, a few applications of a 1 per cent. solution of nitrate of silver, or a few light touches with lapis divinus, or copper sulphate, will cause them to disappear. The following are some of the more recent cases treated as I have described:

1. Mast. J. S., æt. 11 years, schoolboy. His eyes have felt sore, and been discharging during the last two years. Has numbers of true granulations, mostly confined to conjunctiva of both upper eyelids. *Aug. 9th*, 1910.—Commenced treatment with acetic acid. *Nov. 2nd*, 1910.—True granulations have disappeared; is practically well.

2. Mast. D. A., æt. 14 years, schoolboy. About a year ago had an attack of "sore-eyes," which lasted two weeks. His eyes have been more or less sore ever since. He evidently had an acute attack which lasted two weeks, followed by chronic granulations. Has trachoma on conjunctiva of both upper and lower eyelids of both eyes. *Aug. 10th*, 1910.—Commenced treatment. *Dec. 5th*, 1910.—Granulations have disappeared. Conjunctiva smooth and normal.

3. Mast. G. G., æt. 15 years, schoolboy. First felt the eyes sore about a year ago. The eyes have been sore more or less ever since, and discharging, especially in the morning. Has numerous, pale, translucent, granulations on conjunctiva of upper and lower eyelids of both eyes. Commenced treatment *Sept. 15th*, 1910. *Dec. 6th*, 1910, is leaving school for the holidays. Has two or three granulations left on conjunctiva at outer angles of both upper eyelids: these are white and firm. To continue the use of cyanide of mercury lotion.

In this case the granulations were very large, and numerous. These three cases were all of comparatively recent origin, had never been treated with sulphate of copper, had only used lotions ordered by their doctors, so were comparatively free from papillary granulations, and there was no pannus.

In severe old cases with pannus I have had the same success with the acetic acid treatment. About two months ago I saw a young man whom I treated for trachoma fifteen years ago. He then had pannus, and so much alteration of the cornea that he was practically blind. After several months' treatment with acetic acid in the way I have described—at first at short intervals, afterwards at longer intervals, followed by light application of sulphate of copper—the granulations and pannus disappeared, the cornea cleared, and his eyes became quite well, and after an interval of fifteen years, during which time he had had no trouble with the eyes, I examined his conjunctiva and found it perfectly smooth and natural, and the cornea quite clear. In this case both eyes were affected.

When we consider the pathology of trachoma, a collection of lymphoid cells situated in the subconjunctival tissue (see Professor Greeff's paper, THE OPHTHALMOSCOPE, Sept., 1909), it seems more reasonable that we should get dissolution of those trachoma bodies by inserting an agent directly into the collection of cells than by applying an agent to the surface of the conjunctiva. At the same time there should be less danger of injury to the conjunctival tissue, and subsequent contraction, as the action will be circumscribed.

Whatever the action of the remedy is, whether the acid by dissolving destroys the cells, or whether it sets up sufficient irritation to destroy them, or, again, acts as a destructive agents to the microbes or protozoa, I cannot say; but I can say that the true granulations disappear after the pricking, and that

the papillary granulations, if not too old, disappear when the irritation caused by the presence of the true granulations (or perhaps I should say their cause) ceases. If the papillary granulations are of long standing, then when the true granulations have disappeared, the careful touching of the papillary granulations with a fine point of sulphate of copper will cause these to disappear.

In attending to cases of trachoma, I always use a *loupe stéréoscopique*. For pricking the trachoma granulations, I employ either an ordinary tattooing needle, or a needle with a deep groove well down to the point, and bent at a right angle $\frac{1}{16}$ inch from the point, the concavity on the grooved surface.

Again quoting from Professor Greeff's paper, which I have previously mentioned, he says: "The trachomatous process goes very deeply into the tissue. The trachoma bodies disappeared from the surface after a few days' treatment, but reappeared immediately if the treatment is stopped. We do not see the trachoma bodies in the epithelium alone, but also in the subepithelial tissue, in the lymph spaces beneath, in the cells of the follicles, and between the cells."

The finding of the trachoma bodies deep in the tissues, their disappearance from the surface on treatment, their reappearing at once when the treatment is stopped, explains what I have frequently observed in patients suffering from trachoma: that their symptoms are relieved, the disease is checked by almost any antiseptic application, such as solution of cyanide of mercury; but is not cured. To cure the disease it seems necessary to carry a destroying agent more deeply into the tissues; at the same time using a weak antiseptic application to destroy the bodies coming to the surface.

During 1910, I have had one case of spring catarrh to treat in a girl, eight years old. This was a typical case--the milky bloom over the conjunctival surface, the jammed together papillæ forming a tesselated pavement-like surface, the gelatinous masses around portions of the corneal margin. Both eyes were affected. The case was of three years' duration.

In this case I carefully applied acetic acid, using for the purpose a wooden match shaved into a spatula form, thin, and about one millimetre wide: with this, after everting the lid, I applied acetic acid to the granulations, and the gelatinous masses near the cornea; then, after waiting a few moments, washed the conjunctiva with distilled water before allowing the lid to return. This application I made once weekly. During the interval she used at home a 5 per cent. solution of argyrol twice daily.

First, the congestion and irritation of the eyes disappeared; then, the gelatinous masses disappeared; and, gradually, the granulations became reduced in size until only a slight roughness was left. This subsided, the child made no further complaint and seemed quite well. This case was under treatment five months, and has remained well since. One must bear in mind that the treatment of this case commenced in the hot weather and ended in the cool weather, and that there is only one case. On the other hand, the child had suffered continuously for three years, steadily getting worse, and there was no improvement until the acetic acid was commenced, and she has remained well ever since. I bring this forward with the hope that someone else will try the treatment in this very obstinate disease.

I have in other cases of spring catarrah tried adrenalin, yellow oxide of mercury, mercurial-lanoline, etc., but with no permanent benefit.

A NEW OPERATION FOR EXTIRPATION OF THE LACRYMAL SAC.*

BY

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FOR many years I experienced great difficulty in extirpating the lacrymal sac in a neat and workmanlike manner. I used to operate under chloroform and employ Axenfeld's and Müller's retractors. The field of operation was hidden by profuse hæmorrhage, and generally I only succeeded in removing the sac piece-meal, and occasionally, no doubt, I left portions behind. To obtain a really successful result, it is essential that no vestige of the sac be left *in situ*.

It was not until I obtained Josef Meller's *Ophthalmic Surgery* (1908), and read his description of excision of the lacrymal sac that I was able to perform the operation more to my own satisfaction.

I however have found it difficult, even when the field of operation is bloodless, to follow out Meller's directions exactly, and eventually I evolved a modification of his operation which has at least given me complete satisfaction.

I proceed as follows:

By a single insertion of the needle, I inject half a syringeful of Parke Davis' "Codrenine," first under the skin, and then under and around the sac. I next make an incision through the skin alone. I draw an imaginary vertical line through the inner canthus, about 12 mm. long, and on this, using the canthus as a centre, I draw with my knife a complete semicircle (see figure). This marks out a flap, which must be reflected outwards. It requires very careful dissection to separate the skin from the internal palpebral ligament, for as it approaches the inner canthus, the latter becomes very superficial. Any carelessness will result in a button-hole, which is a serious complication. Having reflected the flap, I pass a suture through it and give it to a nurse to hold. I then pass another suture through the nasal lip of the wound, and give that to a second assistant to hold. I am careful not to undermine the nasal lip, for on this side lie all the veins, and any indiscretion in that direction may cause troublesome bleeding.

The field of operation is now fully displayed by a very small incision, and no retractors are necessary. In fact, to introduce most of the retractors, the incision would have to be greatly enlarged. I have also found that these appliances increase the hæmorrhage.

The next stage is to dissect out and to define the ligament. This is done by a few strokes of the knife, which must always be made from the nose outwards to avoid wounding any small venules. I now pass a silk thread under the tendon and the nurse must draw it downwards. The fibres of the orbicularis muscle arise from the palpebral ligament, and have been dissected away with the superficial fascia. Some fibres seem to lie under the ligament; these must be pressed outwards and inwards by blunt dissection, and the deep fascia is then exposed. The palpebral ligament is a specialised portion of the deep fascia, but at its outer aspect it leaves the deep fascia and becomes superficial.

* Read at Annual Meeting of British Medical Association, Birmingham, July 27th, 1911.

The deep fascia must be split vertically with knife or scissors and the sac is exposed. We are now below all the veins, and the sac can be freed from its attachments above with the knife and seized with a pair of tenaculum forceps, and separated from the lacrymal fossa with squint scissors whose points must be constantly kept close to the bone. This dissection, which removes the periosteum as well as the sac, must be continued down to the palpebral ligament. Now getting the nurse to make tension on the skin flap, with the knife we dissect the sac away from the fascia which limits the orbit, and gradually isolate the whole upper half of the sac. The next step is to pass the sac under the palpebral ligament, and have the ligament drawn upwards by its suture. Now both canaliculi are divided and the sac is dissected free down to the duct with scissors. When it is quite free, twist it round and round, to separate the duct from its bony surroundings, and cut it off with scissors as low down as possible. Then unite the skin wound by three horse-hair sutures and firmly bandage a ball of wool sewn up in gauze into the hollow between nose and eye, so that the cavity may be obliterated. The dressings must be renewed frequently to keep up the pressure. The sutures are removed on the fourth day.

The wound almost invariably heals by first intention, and in a few weeks, becomes almost invisible. I have one case in which it is impossible, even with a lens, to see any trace of a scar. I was inclined to believe that a mistake had been made, but the patient assured me that I had removed his sac, and the notes showed that he was correct.

Epiphora is unusual. One of my private patients, who has had a discharge from her lacrymal sac for years, and had contracted a corneal ulcer, tells me that she is absolutely comfortable, and has no epiphora whatever.

The operation is quite easy, and no knowledge of anatomy is necessary to perform it correctly. It is unnecessary to feel for the lacrymal crest. The palpebral ligament is the sole and only guide. My house surgeons, when they have seen me do the operation once or twice, are able to perform it with ease and certainty.

The operation described is not suitable for cases where there has been a phlegmon, with or without abscess formation. In these patients the skin is generally unsound, and all the structures are matted together. It is impossible to turn back the flap without button-holing. In such cases an almost straight incision is best, and it is wiser to sacrifice the ligament. When dissected free, it is so loose that I doubt whether it has any function in holding up the lower lid. Drooping of the lower lid is caused by too freely dissecting away the fibres of the orbicularis muscle. Each case where there has been suppuration must be treated on its merits. It is often extremely difficult to separate the sac externally without button-holing the conjunctiva just under the caruncle. I frequently inspect the eye to be certain exactly where the conjunctival sac is, but occasionally I have opened it. A suture, however, suffices to close the conjunctival sac, and no harm happens. I have now extracted from 70 to 80 sacs, and am more and more pleased with the results obtained.

The operation performed by my method is almost painless and generally bloodless.

OPTICAL PROBLEMS IN OPHTHALMOLOGY.

BY

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III.—Refraction at a Plane Surface.

WHEN light passes from vacuum into any other medium it is retarded, and this retardation causes a deviation of path when the incident path is not normal to the surface of the new medium. In fig. 15 let AC represent a plane

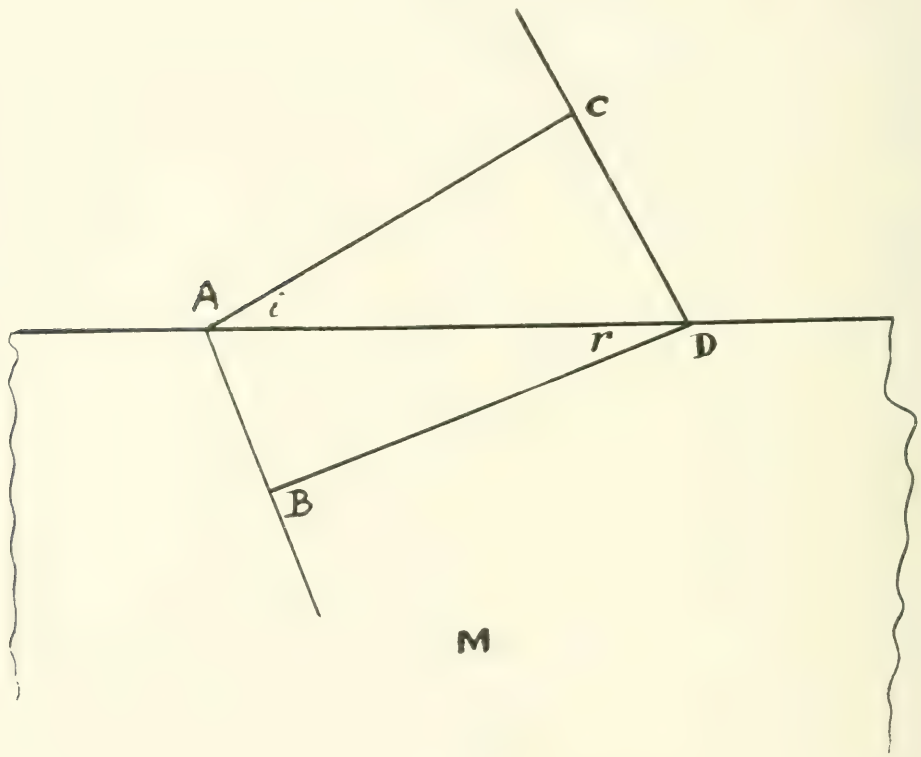

FIG. 15.

wave incident from vacuum (or air) to a new medium M; then while one extremity C of the wave is passing to D, the other A will only reach B. The distance CD is, therefore, proportional to the velocity in air or 1, while AB is proportional to that in the new medium. Further since AD is a common hypothenuse to the angles i and r we have

$$\frac{\text{Sin } i}{\text{Sin } r} = \frac{CD}{AB} = \frac{1}{V} = n \text{ - - - - - - - - - (1)}$$

We have now a ratio between the angles i and r which is constant for any medium; that is the reciprocal of the velocity of light in that medium. This ratio is denoted by n, and is termed the absolute refractive index of the medium. (It should here be noted that the angle made between a wave front and a surface is equal to that between the direction of the light and the

normal to that surface.) In many cases we wish to know the refractive index between two media, neither of which are air. Referring again to fig. 15 it will be seen that

$$\frac{\text{Sin } i}{\text{Sin } r} = \frac{CD}{AB} = \frac{V_1}{V_2}$$

where v_1 is the velocity in the first medium and v_2 that in the second. Since, however, $n = \frac{1}{v}$ we may write

$$\frac{\text{Sin } i}{\text{Sin } r} = \frac{v_1}{v_2} = \frac{\frac{1}{n_1}}{\frac{1}{n_2}} \quad \text{- - - - - - - - - - - (2)}$$

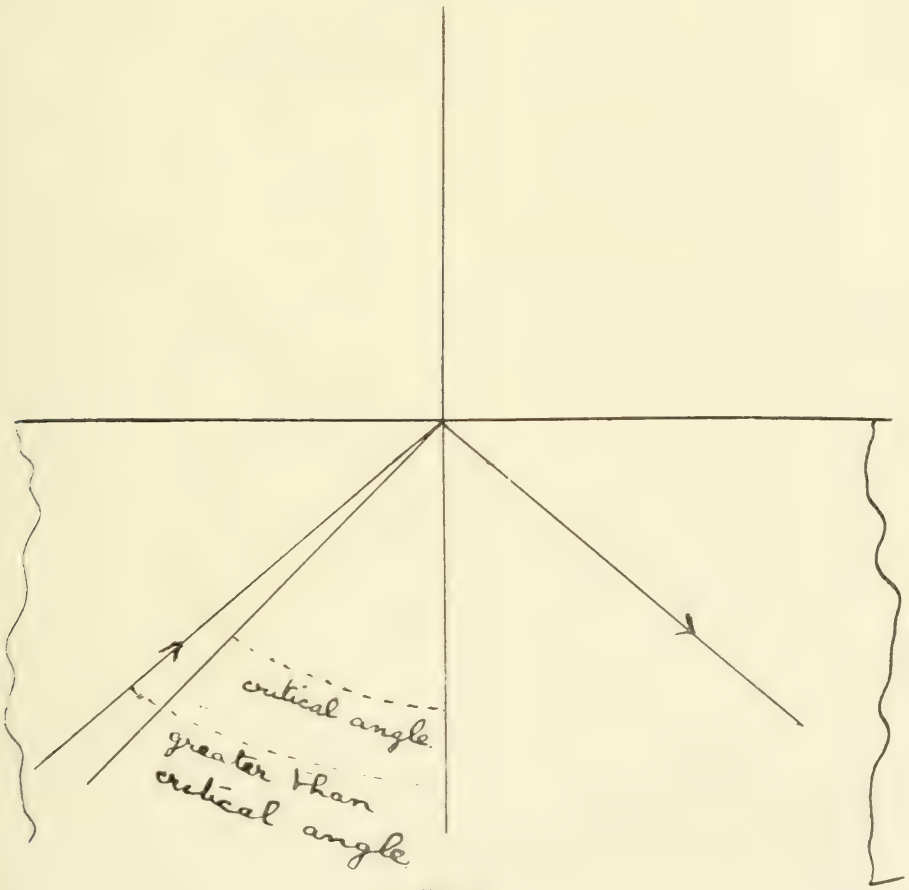

Fig. 16.

This is termed the relative refractive index between any two media. We have now two fundamental equations for refraction at a plane surface.

From 1 $\quad \text{Sin } i = n \text{ Sin } r$ - - - - - - - - - (3) Absolute.

From 2 $\quad n_1 \text{Sin } i = n_2 \text{Sin } r$ - - - - - - - - - (4) Relative.

From these two equations it will be seen that the angle is greatest in the medium having least refractive index. A particular case must here be

noticed. If light is passing from a rare medium to a dense it will pass into the dense at all angles up to 90° since the angle in the dense medium is smaller ; but if light be passing from the dense to the rare medium a point will be found where the angle in the rare medium is 90°. Its sine is therefore 1.

Referring to equation (4) we have in this case

$$n1 = n2 \text{ Sin } r.$$

$$\text{or Sin } r = \frac{n_1}{n} \text{ - - - - - - - - - (5)}$$

This particular value for r is termed the critical angle since any increase in its value will cause the light to be totally reflected at the surface of the dense medium (see fig. 16). In words the value of the sine of the critical angle between any two media is the lesser refractive index divided by the greater.

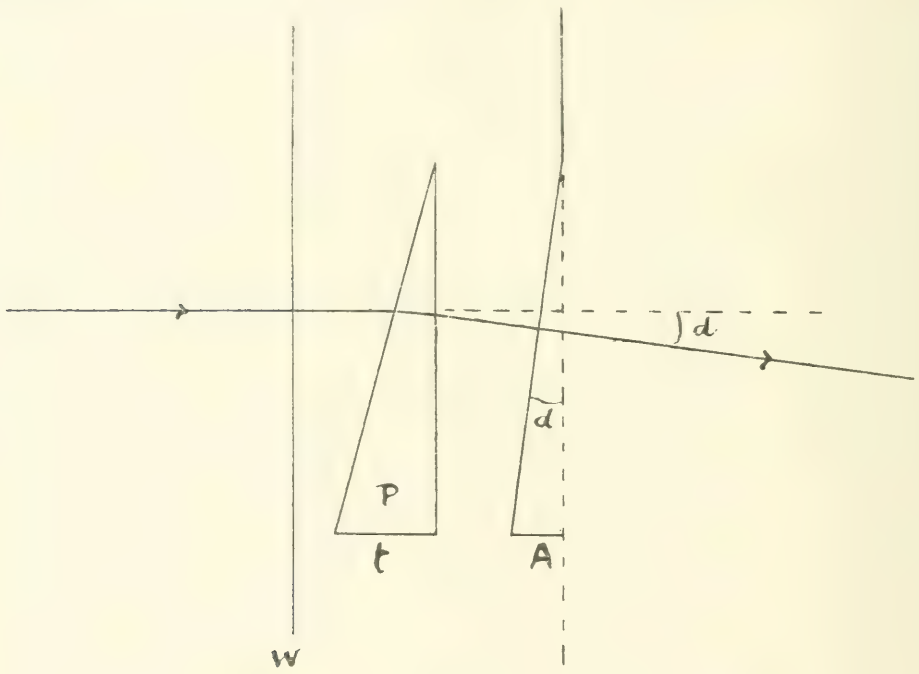

Fig. 17.

The next important point is the retardation. Suppose light to be passing through a thickness t of a dense medium, then in the same time it would have travelled through a greater distance t' of air.* The retardation A is therefore t'—t, but t' = nt, so that A = nt—t, or (n—1) t. - - - - - - - - 6.

This equation is of considerable importance in the development of our work. When light is passing through a number of media, all of whose faces are parallel, it will be seen from equation (4) that for equal values of n we also have equal values for the angle. In the simple case of a parallel plate of glass, the angle before incidence will equal that after passing through the glass, but its path after will be displaced to a path parallel with that on incidence.

*The velocity in air is so closely the same as that in a vacuum that for practical purposes the difference is negligible.

In the case where light is passing through a medium whose surfaces are inclined to each other at a small angle it will be deviated, and the path after emergence will not be parallel with that before incidence. Let P (fig. 17) be a section of a thin prism whose surfaces are inclined at a small angle, the thickness of whose base is t, and W an incident plane wave. That part of the wave passing through the base will be retarded by an amount $A=(n-1)t$.

Where the angles are small, as in this case, we may take the bases as being proportional to a, the angle of the prism, and A to d, the deviation produced. We have, therefore, for thin prisms the equation $d=(n-i)a$. This may be applied with fair accuracy till the angle of the prism is 15°. The next article will deal with reflection at a curved surface, and thin lenses.

CLINICAL MEMORANDA.

ATYPICAL ANNULAR BILATERAL CHOROIDAL COLOBOMA, SIMULATING STAPHYLOMA POSTICUM.

BY

A. A. BRADBURNE, F.R.C.S.Edin.

SOUTHPORT, LANCASHIRE.

THE first glance obtained of the fundus of this case (a gentleman, aged 52, who consulted me in June, 1911, for gradual deterioration of vision), together with the fact that vision in each eye (uncorrected) was only 6/60, was strongly suggestive of high myopia and a typical posterior staphyloma.

Refraction, however, revealed the presence of 2 D. hypermetropia, which, with +1.75 D. spheres brought the vision to 6/5 in each eye. Examination also showed there was no ectasia of the posterior poles.

Detailed investigation revealed a complete ring, greyish-white, surrounding the optic nerve, the width being about a disc and a half, and of practically the same breadth all the way round. The edges of the disc were very indistinct, and that of the border where the retina ended was ill-defined and soft. Very fine granules of pigment were present in three small spots near the outer border in the left eye, and in the right was, except for a very narrow strip, almost altogether absent. The area of the colobomata was faintly tinged with red in places. The scleral coat could only be discerned as an exposed structure in a direction down and out—that is, in the more common position of congenital staphyloma. No other abnormality was present in any portion of either eye. There was no history of trauma, disease, or any subjective or objective feature about the case.

Parsons states that a typical coloboma of the choroid is very rare, and of the cases quoted by him, no mention is made of one presenting characters similar to this one.

HETEROCHROMIA IRIDUM IN CATS.

BY

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Dr. Harrison Butler's review of Heterochromia in the July number of THE OPHTHALMOSCOPE, in addition to the very interesting way in which the subject is handled, deserves the attention of those interested in hereditary and comparative pathology, since it opens up for the Mendelian explorer a vista of unexplored country.

Heterochromia, as Butler says, occurs in cats, and the condition is worthy of consideration because of certain other correlated facts. It was pointed out by Darwin more than fifty years ago, that "cats which are entirely white and have blue eyes are generally deaf; but it has been lately stated by Mr. Tait that this is confined to the males" (*The Origin of Species*, 6th edition, p. 9) The last part of the quotation it will be noted, namely, that the correlation is confined to male cats, is not given by Darwin on his own observation but on that of Mr. Tait. It is not correct. I once possessed a long-haired female white cat with blue eyes that was stone deaf, and I have known of others. Neither its father nor mother, although white, were either blue-eyed or deaf. Feline deafness can easily pass unnoticed in consequence of the high development of the recognition of vibration in cats and by the acuteness of the sense of smell which they possess. In my limited experience, all those cats which were white and had blue eyes were deaf. It is also quite common for white cats to have only one blue eye, and then they are not deaf.

On the other hand, some time ago I saw a congenitally deaf-mute woman, aged 49, whose right iris was blue and the left brown. Static refraction, R. +3 Sph. combined with + 2 Cy.=6/12 ptly. L.+3 Sph.=6/9.

Butler divides heterochromia iridum into two classes, "In one the heterochromia is merely an anomaly, and in the other it is a symptom of a definite disease, which has a perfectly characteristic train of symptoms." I have no doubt that the first form is a teratological condition rather than a disease, and with regard to the second, more or less change in the colour of the iris is a usual symptom in iridocyclitis, due to hyperæmia of the iris. However, it is only the first form to which I wish to direct attention—that is, to the congenital anomaly in which there is no evidence of disease. The two eyes are equally well formed and sight appears to be frequently unaffected in any way. In cats with heterochromia one eye is blue and the other green or yellow or some shade of colour between the two.

In Dr. W. G. Sym's list of ten patients with heterochromia (*Ophthalmic Review*, Vol. VIII, p. 202), eight had each a blue eye.

As is well recognized, practically all children at birth have blue eyes, because the stroma contains very little pigment, and therefore the posterior pigment layer can be seen through it, and if there is no great increase of pigment, such eyes remain blue possibly for life. If in one eye there is a more sluggish deposit of pigment, that one will tend to be bluer than the other. Partial arrest, or partial excess, of the deposit of pigment may occur, and then we see a dark or light patch in a sector of the iris. It is usually stated that in heterochromia iridum the colour of one eye is inherited from the father and the colour of the other from the mother; but this simple explanation does not hold good with cats in which the blue eye has frequently no counterpart in either parent. Nor is such a rule confirmed by Sym's cases. The tendency for the

lighter eye to be more prone to disease than the darker is perhaps in accordance with expectation. The iridic pigment has a protective purpose and its attenuation may lessen this protection, on the *locus minoris resistentiæ* principle, the less pigment the less protection ; nevertheless, I do not think we can generalize and say that blue eyes in non-heterochromic people are more prone to disease than darker irides.

Why white cats with blue eyes should be deaf is not explained by Darwin, but the absence of pigment in the fur and its relative absence in the iris suggest some homologous developmental deficiency, or arrest, in the auditory apparatus. In a similar way we see lamellar cataract frequently associated with deficiency of the enamel of the teeth.

Buffon noticed that albino dogs were deaf, and Rawitz (*Archives d'Ophtalmologie*, T. XXVII, p. 381) in studying the relation of albinism to deafness in dogs, discovered that the organ of Corti was absent, and that the auditory centres were atrophied. The association of deafness with blue eyes and white hair in dogs and cats is confirmed by Abelsdorf (*Archives d'Ophtalmologie*, T. XXV, p. 63).

A CASE OF "HETEROCHROMIC CYCLITIS"

(Heterochromia Iridum).

BY

SYDNEY STEPHENSON,

LONDON, ENGLAND.

THE following brief account of a case of "heterochromic cyclitis" (to adopt the nomenclature recently advocated by Dr. T. Harrison Butler[1]) may be of some little interest to readers of THE OPHTHALMOSCOPE.

The facts are as follows:

On June 24th, 1911, I was consulted by Mr. Laurence H——, aged 29 years, on account of loss of sight in his right eye.

Whilst the patient was in British East Africa in 1909, he became conscious, almost accidentally, of the fact that he had lost the sight of the eye, without injury, pain, or inflammation. On three consecutive days in July of that year he had noticed a "blurring" in front of the right eye, and on the fifth day after this appearance was observed, he had consulted a Government medical man at Kismu. That gentleman declared that a cataract was present, and advised surgical interference when the patient returned to America, of which country the patient was a native. It is perhaps worth noting that in the previous January a lady had noticed some peculiarity about the patient's right eye, and had suggested that "cataract" might be present, but Mr. H—— himself attached no great importance to the observation. It is further to be noted that in the spring of 1906, before the patient left America, his eyes were examined by an ophthalmic surgeon, and the vision of the eyes was found to be equal.

Several ophthalmic surgeons were consulted after the patient's return to America in September, 1909, and the concensus of opinion appeared to be against operation.

There was no family history germane to the case.

Upon examination, a marked difference in the appearance of the two eyes was at once apparent. The right eye had a very obvious cataract, and, more striking still, its iris was much lighter in colour than that of the other eye. It was blue. The pupil, the transverse diameter of which was 4·5 mm., reacted rather sluggishly to the direct stimulus of light. T.n. V.=hand-movements. Projection good. No redness of the eye. No keratitis punctata. The cataract, which was apparently complete, allowed no reflex from the fundus to pass through it. It formed a curious, curdy-looking mass, and on the lower half of the anterior capsule were nine to twelve tiny, round spots of brownish-black pigment. These definitely lay on the anterior capsule of the lens and not on the posterior aspect of the cornea. In other words, they were not instances of what is sometimes spoken of as "pigmented keratitis punctata," although they had probably originated in a similar way, namely, from the pigmented epithelium. Under the influence of atropine, the pupil dilated to 6·5 mm. —7 mm. No posterior synechiæ or keratitic deposits were recognised. The pupil was circular in outline. The cataract was considerably denser in the part corresponding to the dilated pupil than in the more peripheral regions, but no reflex could be obtained from the fundus even through the last-named.

As regards the left eye, the iris was of a greyish-blue colour, the pupil measured 5 mm., and did not react well to light, the tension was normal, and the sight was 6/5 (2 letters).

Removal of the cataract from the right eye was advised.

REFERENCE.

1. **Butler, T. Harrison.**—THE OPHTHALMOSCOPE, July, 1911, p. 501.

NOVELTIES.

A NEW TONOMETER.

BY

SYDNEY STEPHENSON,

LONDON, ENGLAND.

A NEW tonometer, designed by Mr. B. Wolinski and myself, was shown at the last meeting of the Oxford Ophthalmological Congress (July, 1911), where it excited so much interest that it may be worth while to give readers of THE OPHTHALMOSCOPE some idea of its construction and use.

The instrument (figure 1), which is made by Messrs. John Weiss and Son, Ltd., of 287, Oxford Street, London, W., is as simple in its construction as it is easy to control and to apply. It is applied (see figure 2) directly over the closed eyelids of the patient, who sits in an ordinary chair during the few moments occupied by the little operation. By means of a lever, successive increments of weight, measured in millimetres of mercury, are brought to bear upon a spring, and when the tension of the eyeball equals the weight put upon the spring, the fact is shown by the movement of an indicator. The weight necessary in each individual case is then read off from

a graduated scale attached to the instrument. It can also be permanently recorded for future reference and comparison by a slight movement of a lever which pricks it off on a paper chart sold with the tonometer.

The component parts of the instrument (figures 1 and 3) are as follows.— There is a handle (N) for holding the tonometer in position on the patient's face, and a milled head (L) for adjusting it to eyes of varying prominence, or, what amounts to much the same thing, to orbits of varying

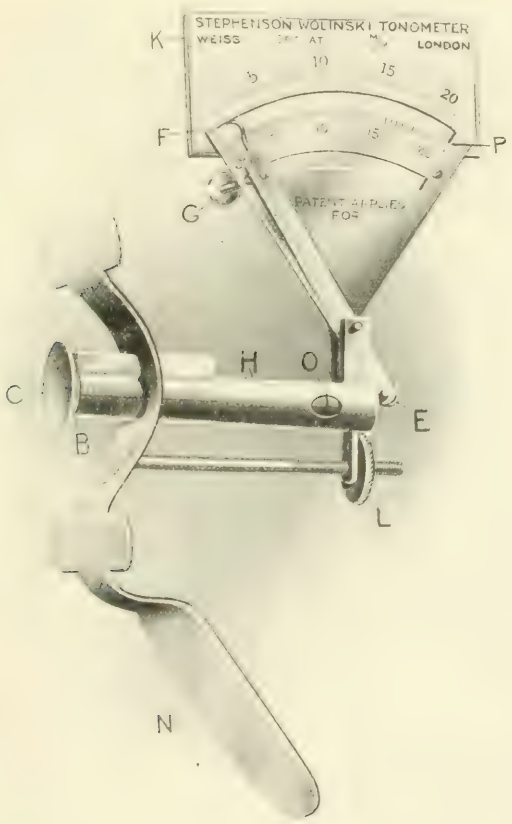

FIG. 1.

depth. A spiral spring (A), constructed of piano wire (which is not likely to get out of order) is contained in an inner tube (B), at the end of which is a concave cup (C) intended to fit over the patient's closed eyelids. With the idea of ready sterilisation, the cup is constructed in such a way as to be unscrewed from the inner tube. The latter (B) is enclosed in a second tube (H), towards the distal end of which is an aperture (O), and an indicator (shown in figures 1 and 3 by a vertical line) intersecting the hole. The spring is actuated by a jointed lever (E), provided with a buffer end (D) where it comes into contact with the spring. The approximately vertical arm of the jointed lever (E) is provided with a handle (G) and

a pricker (F). By moving the handle (G) along the slot provided for the purpose, more and more weight is brought to bear upon the spring (A) through the jointed lever (E). As soon as the intraocular tension is equalised by the pressure upon the spring, the fact is indicated by a movement of the zero line in the aperture (O). The exact weight is then pricked off upon the chart by a slight movement of the pricker (F). K represents the receptacle for holding the paper chart in position.

The foregoing points can be the more readily appreciated by reference to figures 1 and 3.

FIG. 2.

A few words with regard to application of the tonometer.—The cup-shaped bearing of the instrument (C) is placed in apposition with the patient's closed eyelids, and the metal supports in contact with the supra- and the infra-orbital regions respectively (fig. 2). The next step is to adjust the instrument, or, in other words, to lengthen or to shorten the tube by means of the milled head (L) until the vertical red line seen in the hole (O) comes to occupy the centre of the aperture. This indicates (fig. 3) that the inner tube (B) is in apposition with the proximal end of the spring (A). The reading is now taken by pulling the handle (G) outwards until the zero line, seen in the aperture (O), is just broken.

This shows that the compression of the spring within the tube is about equal to the pressure within the eye. The amount, as indicated in millimetres of mercury, is read off from the graduated arc (P) and also simultaneously recorded on the paper chart by the movement of the pricker (F).

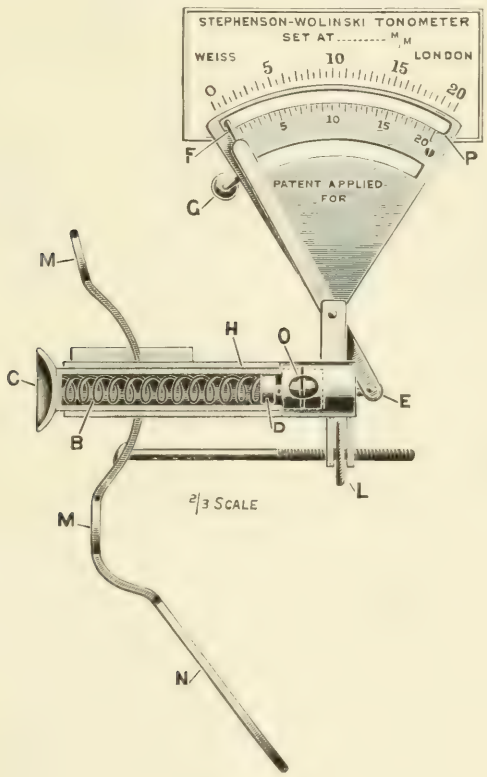

FIG. 3.

The general ocular tension recorded by this appliance appears to include three components:—first, the tension of the orbicularis palpebrarum muscle; secondly, the intra-ocular tension properly so-called; and, thirdly, the recession of the eyeball into the orbit. The first and third of these factors, however, might be expected to remain fairly constant in one and the same patient. The variable factor, as represented by the intra-ocular pressure, would be recorded by the tonometer.

REVIEW.

EYE COMPLAINTS IN THE COURSE OF THE ALBUMINURIA OF PREGNANCY.*

BY

R. BURNIER.

INTERNE DES HÔPITAUX DE PARIS.

IN the course of albuminuria gravidarum various ocular troubles occur. Some of these are sudden in their appearance, pass on towards blindness, but are more or less transitory and not accompanied by any marked lesion of the fundus oculi : *albuminuric amaurosis*. Others are progressive, less intense, but more lasting, because they have an anatomical substratum, an organic lesion visible with the ophthalmoscope : *albuminuric retinitis* and *neuritis*.

(1) Albuminuric Amaurosis.

In a general way, one describes under the name amaurosis a total loss of vision, but the term is usually reserved for eyes which present no ophthalmoscopic lesion. Before the days of Helmholtz, all visual defects arising in the course of albuminuria gravidarum were labelled amaurosis ; and, even since 1855, numerous observations have been published under the title uræmic amaurosis, or eclamptic amaurosis during pregnancy, without any ophthalmoscopic examination having been made. It is obvious that we cannot nowadays make use of these reports, which merely sanctify and perpetuate errors of interpretation.

Observations of amaurosis are much rarer than those of retinitis albuminurica (51 cases of amaurosis to 154 cases of retinitis).

Many of these cases of temporary amaurosis escape notice in the course of the eclampsia, or are not ophthalmoscopically confirmed, whereas the more lasting albuminuric retinitis is more easily observed.

In any case we intend to give the word amaurosis its restricted meaning. It means, then, that condition in which the patient sees nothing and the physician sees nothing either.

Albuminuric amaurosis is more frequent in primiparæ (22 primiparæ to 14 multiparæ). It usually appears at the end of pregnancy, either before, during, or after delivery ; indeed, sometimes as long as a month after it (Stephenson and Herringham).

Its relation to the eclamptic crisis is very variable. Sometimes, the amaurosis appears alone without any convulsion. It can then be considered as a manifestation of eclampsia, a variety of *eclampsia without crisis* Sometimes, the amaurosis comes on a little before the crisis. It is then a true warning signal. Lastly, it may appear at the end of the crisis ; when the patient recovers consciousness, all is dark around her.

The way in which albuminuric amaurosis appears is equally variable. The patient may become blind in a few minutes, both eyes always being equally affected ; stress must be laid upon this fact from the point of view of the differential diagnosis from albuminuric retinitis. In other cases the amaurosis is preceded for some hours by transient dimness of vision, and

*Translated from *Gazette des Hôpitaux*, 4 février, 1911.

especially by accommodation difficulties. The patient finds that she has not her usual ability to read, or to thread her needle. This paresis of accommodation (upon which Sourdille has insisted), should make one consider that an eclamptic crisis is imminent.

Following this progressive amblyopia, amaurosis becomes complete at the end of an interval which varies from a few hours to a day. Perception of light may persist. In other cases blindness is absolute. It is sometimes difficult, if the patient has cerebral symptoms, to tell whether there is perception of light (Babinski). It may also happen that the blindness only affects one of the forms of visual language. Jocqs has recorded a case of eclampsia in which the visual difficulties took the form of word-blindness.

Amaurosis is very often accompanied by other signs of toxæmia gravidarum : headache, vomiting, gastric disturbance, &c. The urine is scanty, high coloured, often rich in albumin, and poor in urea. In severe cases there may even be complete anuria. In some cases there may be no albumin ; but then one finds the other signs of toxæmia gravidarum. This clearly shows that the amaurosis which is called albuminuric is a function of toxæmia gravidarum and not of albuminuria.

The external appearance of the eyes is not sensibly altered.

The pupils in most cases are of normal diameter, or are slightly dilated. They may react normally to light (12 times in 20 cases). In certain cases of absolute amaurosis myosis may be observed. Sometimes, the pupils are fixed and dilated (8 times in 20). The preservation of the pupil reflex is a favourable prognostic sign. At the same time one must not think that cases in which the reflex is abolished are certain ultimately to be blind.

The fundus oculi is normal. This is the characteristic of amaurosis from the ophthalmoscopic point of view. It is true that slight papillary œdema has been observed, but only in exceptional cases. This fact would confirm the mechanical theory of Traube dealing with cerebral hypertension.

In certain very rare cases retinal hæmorrhages have been seen. These hæmorrhages may be due to the rupture of retinal vessels from extreme hypertension in the course of the eclampsia.

Sometimes, there is a coexisting albuminuric retinitis. But the two affections have no direct relation one with the other. Each develops on its own account ; they constitute two different manifestations of toxæmia gravidarum—one transient, amaurosis, the other more lasting, retinitis. The last-named persists when the amaurosis has disappeared.

In general, the duration of amaurosis is short. In mild cases, after a few minutes or a few hours, the sight often returns to normal. In more severe cases the amaurosis may persist for several days, rarely for a week, and often the vision returns, not suddenly, but slowly and progressively. For several weeks the acuity remains defective, varying from $\frac{1}{12}$ to $\frac{1}{5}$ (Sourdille). The patient will continue, even when the acuity has returned to normal, to experience a certain paresis of accommodation which makes any work impossible. These, however, are the exceptional cases.

In some other cases transitory scotomata may be observed (Schmidt-Rimpler).

Sometimes, lastly, hemianopia has been noted after the disappearance of the amaurosis (five days after) or before its appearance. In some cases, indeed, the amaurosis is incomplete from the first, and shows itself as a hemianopia, most often homonymous.

The amaurotic crises may recur several times. Numerous relapses lead one to fear that the sight will not be completely restored. Indeed, in some cases a real optic neuritis, with partial optic atrophy, has been recorded.

It may be said, in general, that in most cases where the patient does not succumb to her eclamptic crises, the amaurosis becomes completely cured.

The **prognosis**, although in a general way favourable, must be guarded in certain cases. The amaurosis may recur in future pregnancies, or the hemianopia may persist.

Absence of the pupil reaction does not always seem to make the prognosis worse. The only two elements which must be taken into account are the state of the fundus oculi and that of the urine. If with a normal eye albumin disappears from the urine, cure is certain ; but if albumin persists, the patient is exposed to all the usual complications of nephritis, namely, retinitis and optic neuritis.

The **pathogeny** of albuminuric amaurosis of pregnancy is still unsettled. One can, however, nowadays exclude the hypothesis of a transient œdema of the retina (Heyl), of the optic nerve (Ebert), or of its sheath (Rothmann).

We must consider rather that the blindness is due to a cerebral process, the site of which can be fairly exactly located in some cases. The preservation, as a rule, of the pupil light reflex shows that the retina, the optic nerve, the chiasm, the optic tracts, the optic thalami, and especially the corpora quadrigemina (the reflex centre to which the optic nerves converge) are not affected.

We must, then, locate the cause of the amaurosis farther on, in the occipital lobe. A bilateral situation would explain complete amaurosis, a unilateral one the occasionally occurring hemianopic phenomena.

As to the actual nature of the pathological process, we are reduced to the merest hypotheses. The ordinarily transitory character of the amaurosis is against the idea of a deep lesion, of a complete destruction of anatomical elements.

The mechanical theory of Traube explains the amaurosis by an arterial spasm, involving a serous transudate which compresses the encephalon. This cerebral œdema would lead to amaurosis by compression of the occipital lobes, and would cause eclamptic convulsions by compression of the cerebral motor centres. The slight degree of papillary œdema, which has been seen in certain cases, would be explained by this theory.

The theory has been accepted with slight modifications by Vaquez and by Bar, who attribute the amaurosis to the hypertension which is always so marked in eclamptics.

More recently, Widal and Vaucher attribute the cerebral hypertension which is the causal factor of amaurosis to the chloride retention, so frequent in acute nephritis with œdema. Weill and Wilhelm have observed this chloræmia in a case of amaurosis gravidarum. These cases of transitory amaurosis connected with chloræmia are to be contrasted with the lasting lesions of retinitis connected with the retention of nitrogen.

The **diagnosis** of albuminuric amaurosis is usually easy in a pregnant woman, with albuminuria, who complains of blindness, which is sudden or more or less rapid, accompanied or not by eclamptic crises, and without ophthalmoscopic lesions. This latter sign is pathognomonic and differentiates amaurosis from albuminuric retinitis and optic neuritis. Whenever, after an amaurosis, the acuity fails to return to normal, a retinal, or neuritic complication should be suspected.

It is quite possible to confuse so-called albuminuric amaurosis, especially when there is no albumin, with hysterical amaurosis. We have the same sudden onset of blindness without lesions, the same preservation of reflexes ; but, on the other hand, hysterical amaurosis is often unilateral, although

Jacobson and Harlent have described bilateral cases. The cessation of the amaurotic crisis is more sudden than in albuminuric amaurosis. It leaves behind it, not a diminution of central acuity, but a marked concentric contraction of the visual field, with achromatopsia, which is especially marked for violet and green. Then, there are the other stigmata of hysteria. Various disturbances of sensation and of excitability, hemianæsthesia, anæsthesia of the soft palate, and contractures of special muscles will put one on the road to the diagnosis.

In the case where non-albuminuric amaurosis follows childbirth, one has to think of the possibility of amaurosis due to loss of blood. It is by no means necessary that the hæmorrhage should be considerable; it all depends on the general state of the patient. In an exhausted woman quite a small hæmorrhage may determine several transitory amaurotic crises.

Cases of amaurosis due to icterus gravidarum are very rare. Only two cases are known, the case of Lutz and that of Landesberg. It is a remarkable fact that in ordinary icterus, even when severe, amaurosis has never been observed. One has to conclude, therefore, that the amaurosis is to be attributed to pregnancy toxæmia rather than to the icterus.

Perhaps the same explanation will serve for certain cases of retinal anæsthesia observed by Silex in pregnant women who show no signs of hysteria.

In certain cases there may be a difficulty as to whether we are dealing with an ophthalmic migraine coming on during or after delivery. But, then, the headache and vomiting usually come on at the end of the attack, and, during the latter, scotomata and partial hemianopia, always homonymous, will indicate the diagnosis.

In all cases the fundus oculi has been found normal. Ophthalmoscopic examination will allow us easily to differentiate these cases of amaurosis without lesions from conditions of the nature of retinitis or of optic neuritis.

(2) Albuminuric Retinitis.

Albuminuric retinitis, during pregnancy, may be observed in three different classes of women:

(*a*) In pregnant women who have no previous renal history and who present, in addition to their eye symptoms, one or several symptoms of toxæmia gravidarum such as we have already described. This is the most common form—albuminuric retinitis properly so called.

(*b*) In pregnant women who, as the result of an infection (scarlet fever, diphtheria, typhoid, syphilis) or of a chill, suffer during their pregnancy from an acute nephritis.

(*c*) In pregnant women who have had a chronic nephritis for several years.

In the two last cases pregnancy is not the cause but is a complication of the renal lesion.

Albuminuric retinitis of pregnancy properly so-called appears according to our own observations, more often in the multipara (54 per cent.) than in the primipara (46 per cent.). It rarely comes on before the sixth month (21 per cent.); especially often in the sixth and seventh month (37 per cent. of cases), and during the last two months (33 per cent.). Retinitis has even been observed post-partum (8 per cent).

It is relatively a rare affection, for we find the proportion to be 1 retinitis to 3,700 pregnant women and 1 retinitis to 45 albuminuric women.

There may be no albuminuria in the course of a retinitis. The other signs of toxæmia gravidarum (sickness, headache sometimes icterus) are usually

present. We have been able to collect seven cases of retinitis without albumin in which the ophthalmoscopic picture was identical with that of classical albuminuric retinitis.

Further, the albumin sometimes makes its appearance after the retinitis, and we can quote several observations of *prealbuminuric retinitis*.

From the histological point of view, the essential lesions of nephritic retinitis consist, as Rochon-Duvigneaud has shown, in an *infiltration* of the retina by elements of the blood (corpuscles, fibrin) and not in a *degeneration* of the retinal membrane. This idea agrees well with the anatomic and functional cure of pregnancy retinitis, since resorption is sufficient without the necessity for any repair of degenerated tissues. It also agrees, we shall see, with the toxic theory of retinitis of pregnancy, and militates against the German theory, according to which the retinitis is a function of a vascular sclerosis which could only cause definite degeneration.

From the pathological standpoint, Opin and Rochon-Duvigneaud and Monthus blame the retention within the organism of some as yet undermined toxic products.

Recently, Widal, Morax, and Weill, in 17 cases of retinitis—not of pregnancy however—have shown the constancy of nitrogenous retention. They consider that the retinitis which is called albuminuric is in reality a retinitis due to retention of nitrogen in the blood (*une rétinite azotémique*) with the serious prognosis of such retention. This retinitis, then, is to be contrasted with simple amaurosis due to chloride retention (Widal and Vaucher). Weill and Wilhelm have also observed a marked nitrogenous retention in a case of pregnancy retinitis.

Clinically, albuminuric retinitis of pregnancy is recognised by ophthalmoscopic signs which are identical with those of the retinitis of Bright's disease. The papilla is soft and shaded, and the retina presents peri-papillary hæmorrhages and white exudates grouped especially round the papilla and macula. Sometimes these exudates form a stellate figure, the "macular star," which is otherwise extremely rare.

The visual defects are not in accordance with the fundus alterations. In this case it is not a question of quantity but a question of situation. A small macular spot will attract the attention of the patient far more than a pronounced œdema of the retina or abundant hæmorrhages in the neighbourhood of the optic nerve.

The visual deterioration is either progressive or proceeds by stages. Blindness is never brutally sudden, as in amaurosis; and if, in the course of an albuminuric retinitis, blindness does become suddenly complete, this loss of sight is to be explained by a transitory amaurosis, which is always of brief duration. Sometimes the discovery of visual difficulty by patients is rather sudden: they find they cannot read or recognise individuals. In such a case there is probably a macular lesion which, however small, is capable of rapidly lowering the central acuity to 1/10 or less. At other times they have the impression of gaps in the visual field. Central or paracentral *scotomata* are not uncommon in the albuminuric retinitis of pregnancy.

The clinical and ophthalmoscopic picture may be modified by the appearance of **complications** which often are only the terminal stage in the evolution of the optic and retinal lesions.

Atrophy of the optic nerve, characterised by more or less complete decoloration of the papilla and by diminution of the acuity, which may go on almost to blindness, is often enough observed as the terminal phase of albuminuric neuro-retinitis of pregnancy. We find it in 13 per cent. of cases.

Choroidal and retinal atrophy and *vitreous hæmorrhages* sometimes occur.

But without a doubt one of the most frequent complications is *detachment of the retina.* In 157 cases of pregnancy retinitis which we have collected there were 29 detachments (17 per cent.).

The detachment may come on rapidly or even suddenly. Certain factors seem to influence its production. Thus, the mechanical effect of any kind of effort (eclamptic crisis, subintrant pains, labour), by increasing the ocular tension, may result in the onset of detachment.

Reattachment usually takes place when the cause which produced the retinitis has disappeared. At the end of a variable time, from eight days (Brecht) to three months (Cirincione), the average being a fortnight (Flemming, Helbron, Lutz, Southey, Bernard), the retina becomes completely re-attached. It is, however, usually possible to recognise ophthalmoscopically the site of an old detachment. At the place of the former detachment there is irregular pigmentation, black patches of various forms which recall the marbled fundus of certain cases of choroido-retinitis; and it is only the strict limitation of these pigmented spots to such a region or such a half of the retina that, in the absence of history, will allow of a differential diagnosis from choroido-retinitis. It is well to bear in mind, however, that even these slight mottlings are often absent (Bernard).

But, while it is true that the retina has a great tendency to become replaced rapidly, it is far from the case that the visual acuity always returns to the normal. In twenty-five cases where the visual acuity was noted, six only recovered normal vision (Cirincione, Ahlström, Southey, Schreiber, Helbron, Bernard); in Holmes' case the left eye only returned to normal. In other cases the acuity varies between 1/3 and 1/6 and even 1/13 (Holmes). The patients of Himmelheber and of Lotz remained completely blind (two cases).

The **diagnosis** of albuminuric retinitis is ordinarily easy. It is, however, possible to confuse the ophthalmoscopic picture of this disease with that of some others. Woods saw a young *chlorotic* girl with menstrual troubles who showed analogous eye lesions without any albumin.

James Bordley, in cases of *cerebral tumour* observed at Johns Hopkins Hospital, saw in sixteen cases out of fifty, in addition to the papillary stasis, retinal spots which might have been taken for an albuminuric retinitis. Urine was normal and the diagnosis of cerebral tumour was confirmed at the autopsy or at operation.

In certain cases the diagnosis of albuminuric retinitis without albumin has been come to during pregnancy; yet the final evolution of certain symptoms allowed the retinal lesions to be attributed to their true cause, namely, syphilis which had up till then been unrecognised by patient or physician (Morax).

But sometimes the diagnosis is more difficult. For instance, in a pregnant woman who has albumin, a syphilitic chorio-retinitis may be labelled albuminuric retinitis. The diagnosis can only be made by attentive ophthalmoscopic examination, which will usually reveal the existence of pigmented spots, especially peripheral spots, with white or yellowish patches of an atrophic or exudative nature. Hæmorrhages are generally absent or few in number.

It is commonly said that the **prognosis** of albuminuric retinitis of pregnancy is very favourable. Of course, as we shall see, the prognosis of this variety of retinitis is certainly better than that of the albuminuric retinitis which comes on in a pregnant woman who suffers from acute or chronic nephritis. But it is a mistake to conclude from that, that there will be complete restoration of vision in every case.

In a general way, it can be said that the prognosis for the mother depends especially upon the extent and situation of the retinal lesions (a macular lesion

is more grave than a peripheral), on the time which has elapsed since its appearance, on good treatment, and, lastly, on the month of the pregnancy in which the trouble began.

When the retinitis comes on in the eighth or ninth month, and if labour is induced, the prognosis is relatively more favourable. On the other hand, it is graver when the retinitis appears at the commencement of pregnancy. Silex saw among 30 patients 3 cases only (in which the pregnancy was interrupted) in which the retinal alterations disappeared, and in which the vision became normal. In all the other cases, the pregnancy having been interrupted, often too late, *restitutio ad integrum* was not obtained. The acuity reached 2/3 in 3 cases, a little more than 1/2 in 6 cases, 1/3 in 6 cases, 1/4 in 2 cases, 1/5 in 1 case, 1/6 in 1 case, 1/12 in 2 cases, 1/18 in 2 cases, 1/100 in 5 cases. More often than not both eyes were equally affected. The last 5 women, who could only count fingers at 1 or 2 metres, could be considered as practically blind. (*Note*:—Adding all these cases together the total is 31.—E.T.) Culbertson, who brought together 43 cases of albuminuric retinitis of pregnancy, established the following percentage: cures 16·66 per cent, improvement of sight 58·31 per cent, blindness 24·99 per cent.

In 116 cases of albuminuric retinitis of pregnancy which we have got together, cases not complicated with detachment of the retina, we find only 22 cases of *restitutio ad integrum*, 42 cases of improvement, 29 cases in which the reduction of vision is so great as practically to be equivalent to blindness, and 23 cases of complete blindness.

The prognosis of albuminuric retinitis is aggravated especially by the existence of retinal lesions, of atrophic lesions of the choroid and retina, and by optic atrophy, although sometimes in spite of the white aspect of the papilla, the sight improves and reaches an acuity of 2/3 (Foerster) or even of 5/5 (Brecht).

Detachment of the retina makes the prognosis slightly worse, as we have seen, in spite of the fact that reattachment is the rule. Out of 26 detachments we have to record 6 complete cures, 9 improvements, 6 cases of almost complete blindness, and 5 cases of absolute blindness, 2 of which ended in death during eclamptic crises.

Albuminuric retinitis recurs frequently in the course of future pregnancies (14 per 100), and the prognosis is then often, though by no means always made worse. Such aggravation in the course of recurrences we have seen 13 times; aggravation as to vision, manifesting itself in blindness, and as to life by the occurrence of death (*aggravation pour la vie se terminant par la mort*). Of course, there are exceptions. Alt saw a case, a primipara in whom the vision had fallen to 1/3 as the result of an albuminuric retinitis; yet there was no such complication during the second pregnancy.

Further, at each new pregnancy there may be an aggravation of the renal lesion, although the retinitis does not necessarily reappear: Axenfeld's case was of that kind. The retinitis was completely cured, and at the following pregnancy, while there was nephritis, there was no reappearance of the albuminuric retinitis.

The prognosis is made worse by persistence of the albumin after delivery. It shows that a chronic nephritis has been grafted secondarily on a pregnancy affection of the kidney. Such an occurrence, which is by no means rare (cases of Silex, Groenouw), is of very grave prognostic significance, because it often entails blindness and even the death of the mother. But even in the cases of pure pregnancy retinitis, the prognosis *quoad vitam* for the mother is far from "benign," since among our observations we find 13 per cent, of fatal endings, and they are sometimes sudden. This simply means that albuminuric

retinitis of pregnancy is always a severe form of toxæmia gravidarum. It is an indication of the impregnation of the organism by the poison, and unless a very active rational therapeusis be adopted, the worst of accidents may happen.

It is perfectly manifest, therefore, that an affection which causes 44 per cent. of blindness or grave diminution of sight, and 13 per cent. of fatality, is no benign complaint, and should not be treated as such.

Further, the **prognosis for the child** is far from favourable. In 61 observations in which the condition of the infant is noted we find 36 deaths of the fœtus, and 25 infants born alive, but of these 25, 13 died a few days after birth, which brings the total fœtal mortality up to 79 per cent.

Alongside of retinitis of pregnancy properly so-called we must place the retinitis which comes on during pregnancy in women afflicted with *acute nephritis* (chill, scarlet fever).

The clinical picture differs little from that of the preceding variety, but the prognosis is more grave. The life of the mother is seriously threatened, since in three cases out of seven death has ended the disease.

Still worse is the prognosis of retinitis which comes on in a pregnant woman who suffers from *chronic nephritis*. In 72 per cent. the blindness has been complete or almost so. The prognosis *quoad vitam* is equally grave, because we find that out of 11 cases death occurred 4 times either immediately or in the course of a uræmic attack, with or without hemiplegia, and twice at the end of a year and a half and 2 years respectively. The prognosis of this form, then, is like that of retinitis of Bright's disease.

(3) Optic Neuritis.

In certain cases the retina remains sound during the whole of pregnancy, yet the disc shews a well-marked œdematous infiltration. This albuminuric optic neuritis of pregnancy, which was well studied by Galezowski, is less common in the primipara than in the multipara. It is most often seen in the three last months of pregnancy. The shorter the duration of compression of the optic fibres, the more easily this neuritis becomes cured. Usually, the sight improves after delivery, but there are cases in which the papilla undergoes a well marked atrophic degeneration and becomes quite white. A very decided defect of sight may result, sometimes even complete blindness (6 cases out of 16).

There is no difficulty in distinguishing this neuritis from retinitis by means of the ophthalmoscope.

Cases of **retro-bulbar neuritis** during pregnancy have been reported (Uhthoff, Level, Churchill, Galezowski, Scheffczyk, Sous). Usually bilateral, this lesion appears generally towards the fourth or fifth month of pregnancy. The fundus is normal, but there is a central scotoma or a central amblyopia.

Diabetes, *malaria*, *insular sclerosis*, *tabes*, *syphilis* are all also capable of causing optic neuritis in the pregnant woman, a neuritis the real cause of which is easily ascertained.

In order to explain those eye troubles which come on at every pregnancy, Hochenegg has blamed an hypertrophy of the pituitary body during pregnancy. In von Reuss' case there was, as a matter of fact, a hemianopia.

After metrorrhagia optic neuritis may appear and may end in total or partial atrophy of the disc (Kries, Bistis, Chevallereau).

Lastly, in the non-albuminuric woman who is pregnant one may find an optic neuritis coming on after the fourth month, usually from the seventh to the

ninth month (Bar, Knapp, Bull, Valude, Holzbach, Weigelin). Usually the vision is completely restored after confinement, but sometimes amblyopia and even blindness persist.

This form is in many respects like albuminuric neuritis : it differs from it in the absence of albumin, but we have seen that this is a contingent characteristic. Both of them are manifestations of toxæmia gravidarum, and the arrest of the intoxication, that is to say, the induction of labour, brings about improvement of vision in both cases. If, on the other hand, the woman is left to herself, optic atrophy frequently occurs (69 per cent.).

(4) Treatment.

We do not need to insist upon the examination of the urine, which should be carefully carried out from the fifth month of pregnancy. At the present day it is a commonplace precaution. But we have seen that eye troubles may precede the appearance of albuminuria, and that the latter may even be completely absent. When, in a woman who is pregnant, one finds repeated vomiting, persistent headache, more or less marked restlessness, and a diminution in the quantity of urine excreted, even if the urine does not contain any albumin, these signs of toxæmia gravidarum should serve to put one on guard, and it is possible that an examination of the eye may be of great service. Posey and Hirst report a typical example of this. Had the ophthalmoscope not revealed the malignity of the toxæmia, it is probable that the labour would not have been interrupted and that the woman would have died of eclampsia.

Ophthalmoscopic examination is called for in every pregnant woman who shows signs of toxæmia, all the more that even if subjective eye signs are absent or do not attract the attention of the patient, the ophthalmoscope may nevertheless reveal changes in the ocular fundus.

What is to be done when the ophthalmoscope has duly revealed the ocular changes ?

In the case of *amaurosis*, since it is usually transitory, there are no indications for intervention. One will treat the toxæmia and the eclampsia rather than the amaurosis. Blood-letting, which gives some excellent results in eclampsia, should be mistrusted for the reason that it may cause optic atrophy in predisposed eyes (Hirschberg, Chevallereau).

In cases of *albuminuric neuro-retinitis*, if the lesions appear within the first six months, all authorities are agreed that the pregnancy ought to be interrupted. The child has little chance of going to term, the sight of the mother is seriously threatened, and the renal affection is certainly aggravated. (This sentence is not clear as it stands. The author doubtless means that in the event of the pregnancy not being interrupted such results will follow. E.T.)

Divergences of opinion commence when we have to consider what is to be done in the case where a neuro-retinitis appears within the three last months of gestation.

Authorities are divided into two camps, the temporisers and the interventionists—on the one hand, the interest of the child, on the other, that of the mother.

The non-interventionists say that in spite of the interruption of the pregnancy, the life of the mother is threatened, and restoration of vision by no means guaranteed. On the other hand, the retinitis, even when complicated by detachment, may become cured without therapeutic intervention. The *rôle* of the practitioner is to preserve life, even that of the unborn, and not to barter it for the, possibly illusory, visual advantage of the mother.

Certainly, say the interventionists, we do not guarantee recovery of vision, but, at least, the mother has a greater chance of life. This opinion is energetically maintained, more especially by the American writers, after Loring, Howe, and Barker. Pooley is among the firmest supporters of this view: "In neuro-retinitis of pregnancy, the induction of labour is not only justifiable but compulsory." (The foregoing quotation is in French, and is here possibly not re-rendered in the author's own words.—E. T.) German authors, following Silex, and French authors, with Lapersonne and Morax, agree with this opinion.

Some twenty years ago Professor Pinard set forth in a few words what should be our conduct in such cases. "When, in a pregnant woman, whether she be primipara or multipara, a severe albuminuria exists (anasarca, persistent visual trouble), and when in spite of strict milk diet for at least eight days, the albumin does not diminish or becomes greater in amount and symptoms become aggravated, then, in the interest of the mother, the course of the pregnancy should be interrupted."

Axenfeld stands in a middle position between the two camps. He advises the expectant attitude, but admits intervention when the visual acuity gets below 1/6 and when it is thought there is a chance of procuring a living infant.

The danger which she courts in becoming pregnant again should be explained to the woman. It is certainly true that there are cases in which neither the retinitis nor the renal lesion recur in the succeeding pregnancy, but in 16 per cent. of cases aggravation of the visual symptoms is quite marked and death is a possibility to be reckoned with. Without going so far as to follow the advice of Snell to practice castration in these cases, it is advisable to interrupt the pregnancy early in every woman who has had retinal lesions during a previous pregnancy.* ERNEST THOMSON.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

1.—ANATOMY.

(1) **Hess, C.—On the topography of the ciliary body and the ætiology of glaucoma.** (Sur la topographie du corps ciliare et l'étiologie du Glaucôme.) *Bull. de la Société Belge d'Ophtalmologie*, No. 29, 1910, p. 48.

(2) **Whitnall, S. E.—On a ligament acting as a check to the action of the levator palpebræ superioris muscle.** *Journal of Anatomy and Physiology*, Vol. XLV.

(1) **Hess,** of Würzburg, has made a study of the individual differences, according to age, of the ciliary processes. The results of this study he embodied in a communication read at an extraordinary meeting of the Belgian Ophthalmological Society held at Brussels on the 24th and 25th of September, 1910.

*The original paper is followed by a bibliography.

In the newly-born, the ciliary processes are very narrow, little elevated, and widely separated one from another. Their surface is black, and their summits lie at some distance from the equator of the crystalline lens. At eighty years of age, the processes are large, their summits are thickened in a pestle-like way, they are separated from one another by narrow spaces, which are occupied by large prominences. Their summits are white, irregular, and covered with bulbous excrescences. The summits may even extend on to the anterior aspect of the crystalline lens, and the iris itself is often thickened at its base. There exist, besides, considerable individual differences.

Hess has found the form natural to persons of eighty years in an individual of sixty years, and even younger, and the form of the newly-born baby at sixty-seven years of age. The diameter of the ciliary ring may be diminished by these bulbar excrescences in absolutely normal eyes, and be smaller by 1 mm. to 5 mm. than the diameter of the crystalline lens. But the increase in the diameter of the lens by diminishing the circumlental space, possesses a certain importance in the origin of glaucoma, as well as the reduction of the ciliary ring.

In the glaucomatous eye we find the ciliary processes on the anterior surface of the lens, and we conclude from that that we are dealing with a pathological swelling causing glaucoma. But according to Hess's researches, it becomes impossible to say if the ciliary processes of a glaucomatous eye are normal or pathological.

In eyes the ciliary processes of which manifest large excrescences, the iris is pushed forwards towards the filtration angle, so much the more so the larger the lens ; but since the iris is thicker in aged subjects, the periphery of the anterior chamber is reduced, so that changes in the diameter of the pupil, formerly without influence upon the intra-ocular pressure, may suffice to obliterate more or less completely the filtration angle. MARCEL DANIS.

(2) The action of the levator palpebræ superioris is usually stated, says **Whitnall,** of Oxford, to be checked by means of the lateral attachments to the orbital margin, near the inner and outer canthi, of its expanded tendon of insertion into the eyelid (the palpebral aponeurosis). After quoting from the literature to show that this is the usual view, the author describes his own dissections, which prove that the fascial sheath of the levator forms more important connections than are usually described. The superficial layer of the fascial sheath of the levator palpebræ superioris is very thin over the posterior half of the muscle, but traced forwards is seen to become gradually thicker, until just before the levator expands to form the palpebral aponeurosis, the overlying sheath of connective tissue becomes condensed to form a ligament which stretches transversely across the muscle and extends laterally to the walls of the orbit on either side, to which it has the following attachments : on the inner side the main connection is with the pulley of the superior oblique muscle, but behind this some fibres can be traced directly to the bone, whilst in front of the pulley a well-marked slip of fascia passes forward to bridge across the supra-orbital notch, being inserted into the bone at either side of it. Externally, the ligament is fixed to the capsule of the lacrymal gland, and also directly to the bone. The ligament lies free above the aponeurosis for the most part, but laterally a few strands of tissue connect the two. Anterior to the ligament, the sheath becomes so thin as to appear to be wholly absent, but with care it can be traced forwards as a delicate layer of connective tissue passing over the aponeurosis and behind the septum orbitale, to join the periosteum immediately behind the origin of the latter from the supra-orbital margin. When traction is made upon the levator palpebræ from behind, the lateral attachments of the ligament are seen to

become tense, the upper part of the eyelid comes into contact with the now tightened and transversely disposed band (the intervening roll of fat acting as a buffer to reduce the force of the action), and further backward movement of the lid is checked.

The roll of fat above referred to by the author is described by him as lying in the angle formed by the junction of the septum orbitale and aponeurosis, and as arching across the orbit beneath the supra-orbital margin.

Whitnall considers that from the anatomical situation and connections of the transverse band it is well adapted to act as a transversely placed check ligament to the levator, and that it is better able to do so than is the aponeurosis through its lateral attachments to the walls of the orbit. If the latter were the sole means of checking the action of the muscle, there would appear no reason why the lid should not be dislocated behind the globe, since the lateral extremities of the aponeurosis are attached at points approximately opposite the equator of the globe.

The article is illustrated to bring out the various anatomical points referred to. ERNEST THOMSON.

II.—ANGIOID PIGMENTATION OF THE RETINA.

Magitot, A. — Angioid pigmentation of the retina. (Pigmentation angioïde de la rétine.) *Ann. d'Oculistique*, janvier, 1911.

Magitot records the clinical and microscopical appearances in a case of the condition usually known as "angioid streaks" of the retina.

The patient was a woman, aged 65 years, suffering from delirium, who was noticed to have bad sight, which was found *post-mortem* to be due to lesions in the cerebral cortex. On ophthalmoscopic examination, she was found to have in each eye a few hæmorrhages and a number of red elongated streaks of the diameter of arteries of the second order. In some segments, chiefly at their extremities, these streaks were free from pigment, resembling veins, but with less distinct edges, and no perceptible blood column; while in others there was a deposit on them of voluminous very dark pigment, much more granular in appearance than that usually seen in choroidoretinal lesions. The whole appearance of the streaks gave the impression of retinal vessels surrounded by sleeves of pigment, but they did not start from the disc, and their course did not correspond with that of the normal arteries or veins, under which they at times passed at right angles.

The patient was sent to an asylum, where she died a year after the clinical examination, when serial sections were made of the eyes. The pigment epithelium was found to be practically normal, and the dominating lesion in all the sections was vascular sclerosis with chronic inflammation involving the uvea, retina, and optic nerve. The retina was full of hæmorrhages, some of them large, dissociating its layers, infiltrating the nervous fibres, and giving rise to massive hypertrophy. In two places the blood had even burst into the vitreous, causing slight retinitis proliferans. The smaller foci of all ages occurred in all the retinal layers, as far as the bases of the rods and cones, but chiefly in the external plexiform layer and the layer of multipolar cells. These hollowed out irregular beds for themselves by pushing aside and destroying the cellular prolongations, and appeared in the specimens as round foci in which the successive changes in the blood could be traced in the serial sections from corpuscles, where the effusion was fresh, through a yellowish homogeneous mass to a deep-brown

slightly retracted mass in the oldest parts. There were no vessels surrounded by pigment. The author considers that the pigmented streaks seen ophthalmoscopically consisted of these elongated hæmorrhages in the external plexiform layer originating in the deep capillary network and terminating in older small round black hæmatomata. He explains the occurrences of deposits of blackish fibrin as due to the situation of the lesions in an area of the retina where the elements are perhaps denser than elsewhere, and where the rupture of the very fine vessels can furnish only a very feeble hæmorrhage giving rise to a minimal drop of blood which becomes either a black grain or a prolonged streak which has the appearance of a pseudo-vessel.

R. J. COULTER.

III.—MONOCULAR DIPLOPIA.

Wolfflin, Ernest.—On the different causes of monocular diplopia. (Ueber die verschiedenen Ursachen der monokularen Diplopie.) *Archiv für Augenheilk.*, April, 1911.

This paper consists of an examination of all the cases fully reported for 70 years, together with an extensive bibliography. The cases are arranged in groups according to their ætiology.

Wölfflin begins by referring to Scheiner's well-known experiment whereby it is possible to produce monocular diplopia by looking through two holes placed close together in a card. If three holes are present then triplopia will be produced. We meet with a similar state of affairs in polycoria and irido-dialysis. He refers to a case by Hirschberg and Dufour where triplopia was present, being due to irido-dialysis and dislocation of the lens in the same eye.

Monocular diplopia may be due to irregular astigmatism produced by a corneal ulcer. The cornea in front of the pupil area must be involved. The irregular astigmatism, however, may be due to a lenticular change, and sometimes both lens and cornea are involved together. In these cases dilation of the pupil may bring about the condition where it is not present normally. To this group belongs the diplopia in senile cataract.

He records an interesting case from Dufour's clinic. It was one of post-diphtheritic paralysis of accommodation, with typical unilateral diplopia when objects were looked at close at hand. It was found on moving a stenopaic slit over the pupil region, that in the central region only was this present, and so the centre of the lens must have presented irregular refraction. This phenomenon should be present in keratoconus and lenticonus, but Mauthner has failed to find it three cases of keratoconus.

Another set of cases Wölfflin calls the asthenopic group. He refers to the fact, which must be familiar to us all, that when one eye only is used for some time for near work, especially microscopy, double sight appears in the unfatigued eye. Levy found that a stenopaic slit removed this and the condition disappeared after a few hours. He explains the phenomenon by supposing a partial contraction of the ciliary muscle. For exact work like microscopy, visual acuity must be good. Astigmatism in the observing eye calls for correction by partial contraction of the ciliary muscle, and this also takes place in the eye not being used, but here the astigmatism is different from that in the eye used, and so the lenticular astigmatism so caused produces the

diplopia. In some cases no doubt where the unused eye is closed tightly, lid pressure on the cornea is a factor, as pointed out by the late Dr. Bull, of Paris, to whom Wölfflin, by the way, does not refer, although his name appears in the bibliography.

Wölfflin points out the difficulty in explaining diplopia of monocular type due to cerebral trauma, for he cannot see how doubling occurs in the occipital lobe. He is in favour of a central or peripheral disturbance of accommodation resulting from commotio cerebri. Of course, some change may occur, due to damage to the refractive media, especially the lens. There is no real evidence, as yet, of a cerebral (occipital) diplopia.

Monocular diplopia in hysterical cases is not a rare occurrence. In many there is a history of trauma, and even where this is not so, Wolfflin believes that the condition is a secondary one due to some cause, such as upset of accommodation. The main condition is the existence of a physical change in the eye. He is in entire agreement with Hummelsheim, who believes that in the so-called hysterical cases, on more careful examination, a physical cause can be found. He refers to Lawson's case of diplopia after a subcutaneous injection of morphia. Here there was interference with near and distant sight, as well as contraction of the pupil, and he holds that this case belongs to the class of lens diplopia.

Snellen's case is mentioned where there was a doubling of the test type lowest line, and the ingenious explanation offered was that the rays were reflected back from the posterior surface of the cornea to the anterior, and thence back again into the eye. Rochat experimented on himself with regard to clearing this matter up. He got a similar doubling of the test type, but when he dilated the pupil and covered first the upper and then the lower half he only saw one row of letters in either case. This puts Snellen's theory out of court.

He also refers to those cases where there is a false macula met with in squinting eyes.

In concluding, he remarks that monocular diplopia is a physiological rather than a pure pathological process, and thinks it is more frequent than we have believed. He leans entirely towards a physical explanation. Dilatation of the pupil in many normal eyes can give rise to monocular diplopia, but most important as a cause is irregular astigmatism of the lens and cornea, and possibly also faulty centering of the refractive media. That spherical aberration enters into the cause there is no doubt, but chromatic aberration does not appear to be so disturbing, and although theoretically possible to produce monocular diplopia with coloured images, he has met with no recorded case. In the human eye this is better guarded against than some of the other physical defects. Monocular diplopia is usually met with in persons of advancing or advanced age; it is rare in the young. Usually, the phenomenon is one-sided, but in some cases it has been bilateral.

He concludes by giving a summary of the causes of monocular diplopia, as follows:—

Group 1.—Cases without physical basis with the formation of false maculæ.

Group 2.—Cases with a physical basis, of which the following can be distinguished:—

(1) Diplopia after Scheiner, as in polycoria and irido-dialysis.

(2) Cases due to irregular astigmatism (and perhaps regular astigmatism) of cornea and lens.

(3) Cases due to asthenopia, probably accommodative changes. It lasts for a few hours only.

(4) Unilateral diplopia of hysterical origin and cured by suggestion,
(5) Cases attributable to cerebral imagination. The diplopia disappears after a few weeks or months.
(6) Diplopia arising in normal eyes through double reflection of the incident rays on the cornea, possibly due to decentration of the refracting media. R. BEATSON HIRD.

IV.—THE MOTOR MECHANISM OF THE EYES.

Kunn, Carl.—The motor mechanism of the eyes exemplified in motor paralysis without so-called secondary contracture and in paralysis of the lateral rotators with intact convergence. (Der Bewegungsmechanismus der Augen erläutert an der Augenmuskellähmung ohne sog. Sekundärkontraktur und an der Lähmung der Seitenwender bei erhaltener Konvergenz.) *Beitr. z. Augenheilk.*, Dezember, 1910.

Kunn, of Vienna, finds that he cannot accept the modern views on ocular paralysis, on account of the cases he has met with without secondary contracture. On seeing such a case for the first time, he referred to the literature on the subject. There he found it stated that when the paralysis is of some short standing, a spastic contraction develops in the antagonists of the affected muscle, and a manifest squint in the direction of the antagonist appears—a paralytic strabismus. It is well-known that in congenital paralyses contracture of the antagonists does not take place, but Kunn describes cases of a distinctly acquired nature. Up to that time he had looked upon the fact of the presence or absence of secondary contracture as a point of differential diagnosis between paralyses of congenital and acquired origin. At first he imagined the anomaly to be dependent on the nature of the central lesion. In two well-marked cases of the kind *post-mortem* examinations were made, when it was found that the nature of the lesion yielded no explanation.

Thinking that the phenomenon might be explained on purely mechanical grounds, he ransacked the literature on the motor mechanism of the eye. He found that, on the one hand, Zuckerkandl and Erben, and, on the other, Schnabel, sought an explanation in diametrically opposite theories, between which it appeared impossible to decide.

Zuckerkandl and Erben base their explanation of the motor mechanism of the eye on their interpretation of the actions of the posterior spinal and of the anterior abdominal muscles in the maintenance of the erect attitude. They say that, in bending from the upright position, the erectores spinæ are contracted, and that the abdominal muscles become relaxed. Only when bending from a position of dorsiflexion do the abdominal muscles become contracted—up to the point of attaining the upright position. For bending, then, they say, the extensors are essential, for dorsiflexion, the abdominal muscles, for flexion to the right, the left lateral muscles, and for flexion to the left, the right lateral muscles are essential. They apply this principle to the eye muscles in the following way.—If the external rotator is the only working muscle of an eye, so that all the others are paralysed, and if the eye is in the position of external rotation, it can be brought into the mid-position without action of the adductor. The forces which effect this are the elastic pull exerted by the whole of the tissues surrounding the globe. From this they assume that the eye is rotated from one canthus to the other, in such a way that the movement from one canthus to

the mid-position is effected by the relaxation of the antagonist, the "agonist" remaining relaxed. If the left medial is paralysed and one looks from right to left, the left cornea, in extreme rotation to the right, remains somewhat outside the mid-position, and continues in this position till the moment when the right cornea gets beyond the mid position. From there on the left lateral comes into action, as is shown by the movement of the left cornea. This proves that the right medial also comes into action only at this moment, as these muscles are associated. In the movements of internal and external rotation, then, the antagonists are relaxed, but only from that moment when the "agonists" are stimulated to an active contraction. The authors of this theory seem to be oblivious of the fact that the mid-position is not necessarily coincident with the position of physiological rest. Somewhat in contradiction to their theory, the authors say that it is a remarkable fact that in most lateral paralyses the affected eye, in both phases of a lateral movement, accompanies the excursions of the sound eye.

Schnabel explains the motor mechanism of the eyes in the following way.—Let the right lateral muscle be paralysed and let the eyes be moved from the extreme left to the extreme right. In the first place, the left eye goes out of the left outer canthus to the mid-point, and the right eye, from the left inner canthus to only about 4 mm. of the mid-point. In the second place, the left eye moves from the mid-point to the inner canthus, whilst the right eye moves only as far as the mid-point. From this Schnabel concludes that the rotation of the left eye is due to the relaxation of the left lateral, *plus* the contraction of the hitherto relaxed left medial rotators. The rotation of the right eye is due to the relaxation of the hitherto contracted right medial alone. The relaxation of the right medial is incomplete during the movement from the inner canthus to the mid-point, and is completed only during the movement from the mid-point to the outer canthus. Thus, only when the centres of the corneæ are in the extreme right position, are the left rotators completely relaxed. The left rotators are thus still somewhat contracted when the corneal centres reach the mid-point on their way from the right canthi to the left canthi. In the paralysed eye this contraction is evidenced in the so-called secondary contracture. In the sound eye this "secondary contracture" is masked by the equally strong contracture of the antagonist. Schnabel proceeds in the following way.—1. The innervation for rotation consists of an impulse, for relaxation of the antagonists, and stimulation of the "agonists." 2. The rotators move the eyes to the canthi of the same side from the canthi of the opposite side.

So far Schnabel's theory does not explain the occurrence of total paralysis of a rotator without secondary contracture of the antagonist. This difficulty Schnabel tries to get over by assuming that, in such cases, the horizontal course of the cornea is reduced to one half of the normal length. He states, further, that the position of equilibrium coincides with the mid-point of the course of the cornea, but that the latter coincides by no means invariably, even in eyes with sound muscles, with the mid-point of the lid.

Alfred Graefe held that the adducted globe was moved back to the lid mid-point by the contraction of the lateral alone, thus assuming that the lateral is already contracted when the cornea reaches the lid mid-point, but affirmed that the latter is in the position of physiological rest, when all the muscles are quite relaxed. According to Schnabel, the mid-point is taken up owing to the resultant of equal contraction of all the ocular muscles. This, likewise, is the position assumed when all the muscles are fully relaxed, as in death and in ophthalmoplegia perfecta.

Kunn criticises Schnabel's explanation of the phenomenon of total paralysis

of a lateral muscle without secondary contraction of the antagonist. He admits that in such cases the horizontal course of the cornea is reduced to one-half. If the cornea is in the mid-point of the lids, two muscles must be in equilibrium, of which one (the paralysed one) is relaxed to the maximum, whilst the other is half contracted, for its total relaxation, according to Schnabel's theory, is possible only when its antagonist (the paralysed muscle in this case) is contracted to the full. That Schnabel's theory is quite untenable is readily proved. Let us take a case of total congenital paralysis of the external rectus. If the eye is in the lid mid-point, which corresponds to the outer extremity of the horizontal course (which is one-half of the normal), one must assume that the medial is quite relaxed, for the globe is in the position of full abduction.

Furthermore, the artificiality of Schnabel's theory is obvious. In nature generally, rest and the minimum expenditure of energy are sought after. Why should it be otherwise in the case of the eyes? In the case of normally orientated eyes distant vision is felt subjectively to be rest, if the mid position of the eyes is assumed, and maintenance of any other position, to be an exertion. In this way are the symptoms of muscular asthenopia to be explained. These are the cases in which the symmetrical position of the eyes, which is necessary for the maintenance of binocular vision, does not coincide with the position of physiological rest; hence follow the sensations of fatigue and pain.

Kunn now proceeds to the elucidation of his own views.—He agrees with Zuckerkandl and Erben in that he considers that the position of rest of the eyes is that in which all the ocular muscles are relaxed to their fullest extent, but adds that this position in many cases is incompatible with the maintenance of binocular vision. In other words, the primary position of rest frequently conditions a squint, so that the individual, even on looking straight forwards, in order to maintain binocular vision, is forced to use muscular contraction. In these cases, during sleep and at death, the primary position of rest (squint) obtains. The optical relations of the eyes have, moreover, an influence on another symptom of ocular paralysis, *i.e.*, on the position of the head when looking straight forwards. In such cases we are accustomed to find that the head is turned in the direction of the paralysed muscle. This is done in order to overcome the diplopia. Kunn cites a case of paralysis of the right internal rectus where the head in direct vision was held to the right. His explanation is that the primary position of rest in such a case is such that the centres of corneæ in both eyes are placed to the outside of the lid mid-point. This seems probable, as, in the case mentioned, there was myopia to the extent of 9 D. in the right eye, and 1 D. in the left. In the above case, further, the corrected vision was only 6/12. Therefore, the diplopia was neglected in order that the left eye might assume its position of primary rest. From this it follows that, apart from the degree of paralysis, the affected eye may take up other positions than that coinciding with the primary position of rest; or, in other words, that the position of squint is not necessarily identical with the primary position of rest. On the other hand, in ocular paralysis without "secondary contraction" and with mid-position of the paralysed eye, the covering of the sound eye will have no influence on its position. If the paralysed eye, however, rest in the position of squint, and, in addition, in the primary position of rest, and if it is forced to fix by the covering of the sound eye, two things may happen.—Either the affected eye may assume the mid-position (which shows that the case is one of paresis), when the secondary deviation of the sound eye will come into evidence, or the eye remains in the squinting position (where we have to deal with a case of paralysis)

when no secondary deviation will occur, but the patient will move the eye in the direction of the affected muscle in order to accomplish fixation. Hitherto, we have been accustomed to gauge the degree of paralysis by the amount of "secondary contracture," but the latter is quite independent of the degree of paralysis, for it corresponds to the distance between the mid-position and the position of squint, which coincides with the primary position of rest, except where the optical relations interfere with the former. Thus, ocular paralysis without secondary contracture is simply the special case where the primary position happens to coincide with the lid mid-point.

Kunn's theory, therefore, is identical with that of Zuckerkandl and Erben, except that the latter, not realizing the difference between the primary position of rest and the mid-point, have not explained many phenomena incident to cases of paralytic strabismus. Their theory, however, explains the occurrence of abductor paralysis without loss of convergence. Formerly, very complex brain lesions were supposed to account for this condition.

Kunn also points out that the primary position of rest is liable to variation during growth, owing to changes in the relations of the orbital contents: hence the uncertain results after tenotomy. ERIC A. THOMSON.

(Jerusalem.)

V.—PHLYCTENULAR DISEASE.

(1) **Weekers, L.—The pathological anatomy of ocular phlyctenulæ. (Anatomie pathologique des phlyctenes oculaires.)** *Académie de Méd. de Belgique*, 25 juin, 1910.

(2) **Weekers, L.—Ocular phlyctenulæ. (Recherches au sujet des phlyctenes oculaires.)** *Thèse d'agrégation présentée à la Faculté de Médecine de Liège*, mai, 1911.

(1) **Weekers**, of Liège, has subjected to microscopic examination twenty-seven cases of phlyctenulæ at various stages in their evolution.

He describes three stages, *viz.*, infiltration, ulceration, and cicatrisation. During the period of infiltration lymphatic vessels are abundant and the capillaries are so much dilated as to give a spongy aspect to the phlyctenule. The nodule then becomes infiltrated with polynuclear cells. Weekers has never found giant-cells of the Langhans' type. Vasculitis and perivasculitis are to be seen. The thickened epithelium becomes infiltrated with many polynuclears and lymphocytes. Epithelial prolongations extend into the depths of the tissues, and the limits between the cells get effaced. The epithelial changes, minutely described by the author, lead Weekers to regard the ocular phlyctenule as something quite different from the vesicle of eczema. In the stage of ulceration the epithelium becomes thinned and vacuolated, and the base of the ulceration is occupied by leucocytes covered with fibrin. In the period of repair the epithelium undergoes exuberant proliferation, so as to form prolongations towards the surface and in the depths of the tissue. The leucocytic infiltration is replaced by cicatricial tissue.

The evolution of ocular phlyctenules is the same in the adult and the child. In syphilitic papules, on the other hand, the microscopic structure is absolutely different.

By the ophthalmo-reaction Weekers has not found giant-cells, but the structure is the same.

Despite many researches, the author has never succeeded in finding Koch's bacillus in phlyctenulæ. From a clinical and anatomical point of view, Weekers identifies ocular phlyctenulæ with tuberculides. MARCEL DANIS.

(2) In the course of this clinical, anatomical, and experimental study, **Weekers**, of Liege, tries to establish the analogy between ocular phlyctenulæ and cutaneous tuberculides. His work is divided into three parts: 1, the pathogeny of ocular phlyctenulæ; 2, the pathological anatomy of phlyctenulæ; and 3, experimental researches on phlyctenulæ, and the action of tuberculin upon the conjunctiva.

First Part.

Tuberculosis is common among patients affected with phlyctenular conjunctivitis. Among 156 children below fifteen years and 58 adults (116 girls, 40 women, 40 boys, and 18 men) examined, Weekers has made out the following points:

1. There is often a family history of tubercle (56 per cent. among the children and 41 per cent. among the adults).
2. Localised tuberculosis is common (36 per cent. in the children and 27 per cent. in the adults).
3. von Pirquet's cuti-reaction is positive in 91 per cent. of the children and in 55 per cent. of the adults.

The foregoing observations appear to show that phlyctenulæ develop by preference upon a tuberculous soil.

That the phlyctenule is a toxi-tuberculide appears to be demonstrated by the following facts:

1. Phlyctenulæ develop by preference in tuberculous children.
2. The lesion reacts locally to subcutaneous injection.
3. Phlyctenulæ often make their appearance after an ophthalmo-reaction.
4. Phlyctenulæ often appear among patients submitted to cure by tuberculinisation.
5. There exists an anatomico-pathological analogy between natural phlyctenulæ and those which result from the ophthalmo-reaction.
6. Lichen scrophulosum often appears simultaneously with ocular phlyctenulæ.

Second Part.

Weekers has studied the histological structure of phlyctenulæ in the several stages of infiltration, ulceration, and cicatrisation.

1. *Stage of infiltration.*—The conjunctiva presents dilatations chiefly of the lymphatic vessels, diapedesis of leucocytes, and serous transudations into the interstices of the conjunctival tissues. The epithelium shows leucocytes on the surface, a thickening and degeneration of certain cells, together with the formation of vacuoles filled with serosity.

2. *Stage of ulceration.*—Prior to ulceration, the epithelium becomes raised and attenuated. As a rule, the ulcerations appear at several points. Sometimes the epithelium may disappear completely, or, on the other hand, it may disappear only from the summit of the phlyctenule. Beyond the ulcerated part, the epithelium is infiltrated and shows here and there vacuolation of its cells. At other places it may be thickened and proliferating. The base of the ulcer is occupied by masses of leucocytes covered with fibrin. The conjunctival cells are frequently degenerated.

3. *Stage of cicatrisation.*—The epithelium proliferates abundantly, and shows prolongations. Karyomitosis can be recognized in the superficial strata. Fissures form between the superficial necrotic layers and the deeper sound layers. Infiltration is replaced by connective tissue fibres in the conjunctiva.

Phlyctenulæ occurring in adults, those supervening during the course of a microbic conjunctivitis, and those complicating an ophthalmo-reaction due to tuberculin, possess the same histological structure.

Third Part.

Weekers has studied the action of tuberculin on the conjunctiva of animals, sound and tuberculous. He has never been able to produce the formation of phlyctenulæ after instillation of tuberculin into the eyes of healthy animals, even after irritating the conjunctiva. In these animals the ophthalmo-reaction is not obtained. On the contrary, among tuberculous animals, by injecting an emulsion of bovine bacilli into the peritoneum, he has suceeded in provoking upon the conjunctiva an eruption that offered a great likeness to ocular phlyctenulæ as they occur in human beings. The ophthalmo-reaction was positive.

Finally, Weekers has studied in the rabbit the phenomena of anaphylaxis.

MARCEL DANIS.

VI.—EXPERIMENTAL RESEARCHES UPON NON-GONOCOCCAL OPHTHALMIA NEONATORUM.

Morax, Lindner, and Bollack.—Experimental researches upon non-gonococcal ophthalmia neonatorum. (Recherches expérimentales sur l'ophtalmie non gonococciques des nouveau-nés dite "à inclusions.") *Annales d'Oculistique*, mai, 1911.

In the year 1908, Stargardt announced at the Heidelberg Congress that he had found so-called "chlamydozoa" in a case of non-gonococcal ophthalmia neonatorum. The observation was confirmed by Schmeichler. At the Budapest Congress held in the following year Heymann maintained that the discovery of these bodies in ophthalmia neonatorum constituted a weighty argument against the specificity and the parasitic nature of the corpuscles. The question was then taken up by Prowazeck and Halberstaedter, Lindner, and Wolfrum. The first-named observers (see THE OPHTHALMOSCOPE, 1910, p. 335), while confirming Heymann's discoveries, in the sense that they had found the inclusions in non-gonococcal ophthalmia, expressed their belief that the disease in question was an epithelial malady (*epitheliosis*), analogous to trachoma, the causative organism of which was to be sought in a similar inflammation of the genito-urinary mucous membrane. This hypothesis appeared to be substantiated by the discovery of inclusions in the urethral epithelium of a woman whose infant was affected with a similar kind of ophthalmia. Lindner found the bodies in cases of non-gonococcal ophthalmia neonatorum, and inoculated the conjunctiva of an ape with the secretion. Inflammation resulted, and the characteristic inclusions were found in the epithelium of the inflamed conjunctiva. In the course of subsequent work with Fritsch and Hofstaetter, Lindner found this special type of infection both in the paternal urethra and in the maternal vagina. His experiments led him to conclude that, like the gonococcal virus, the virus of non-gonococcal ophthalmia might vegetate upon the genital and ocular mucous membranes and become transmitted from one to the other under the same conditions. This view has been confirmed by the researches of Wolfrum, Heymann, and others. It seems also established by the work of Heymann and Lindner that this particular infection may be superposed upon a gonococcal infection, although the association is in reality rarer than was at first believed—14 cases among 32 cases of superposed infection (Heymann); 4 mixed cases among 53 cases of gonococcal ophthalmia neonatorum (Lindner).

Morax, Lindner, and **Bollack** have conducted an enquiry, described in the present communication, with the object of ascertaining whether the facts in Paris (a city where trachoma is much rarer than in Vienna or Breslau) tally

with those summarised above. With this end in view, they have investigated experimentally and bacteriologically thirteen cases of non-gonococcal ophthalmia neonatorum, most of which commenced from the fifth to the twelfth day after birth. The secretion from the eye was slight or abundant according to the case, but the lower fornix was almost always swollen, and the mucous membrane was seen to lie in parallel folds when the lower lid was pulled down. The surface of the inflamed conjunctiva, first freed from secretion, was rapidly but energetically scraped either with a special platinum instrument or with the edge of a cover-glass. The little operation should be practised upon the tarsal conjunctiva, approaching as near as may be to the *cul-de-sac*. The material obtained in this way was smeared upon cover-slips or slides, dried, fixed in absolute alcohol, and, finally, stained with Giemsa. The particular solution employed contained Giemsa 5 drops, 10 per cent. solution of acetic acid 5 drops, and distilled water 10 c.c., and the specimens remained in the liquid for one hour. After that they were rinsed, dried, and mounted in oil of cedar. The cells which included parasites could be recognized even under a low power of the microscope, and when such were found, they were examined with an oil-immersion. The oil of cedar was next removed, and the specimens were re-stained according to the Giemsa *technique*, as follows.—Smears were stained for two hours in a mixture of Giemsa 5 drops and neutral distilled water 10 c.c., rinsed, dried, and examined with an oil-immersion lens. By these means it became easier to examine the inclusions and to find the so-called "initial bodies."

The inclusions, which were found only in the epithelial cells, varied much in number, and it was necessary, as a rule, to examine many microscopical fields before coming across them. Their demonstration is far from being as simple a matter as that of finding a pathogenic microbe of the conjunctival sac. The "initial bodies" are usually extracellular. Their number is restricted, and their discovery correspondingly difficult.

The results were as follows.—Among the thirteen cases examined inclusions (usually without other micro-organisms) were found in nine instances A series of inoculations into chimpanzees or apes was carried out at the Pasteur Institute, Paris. The tarsal conjunctiva and the *culs-de-sac* were rubbed for several seconds with the platinum instrument smeared with material from the infant's conjunctiva.

Of the five inoculations practised, three yielded positive results. In the course of a few days, the palpebral fissure of the inoculated animal became smaller, there was a little secretion, and some thickening of the mucous membrane. This reaction, which was accompanied by palpebral redness, lasted about a fortnight. It was succeeded by slight thickening of the conjunctiva, together with a few follicles somewhat more apparent in the lower *cul-de-sac* than elsewhere. During the reactional period, inclusions, like those of the original case, could be found in the epithelium of the monkeys' eyes. Inoculations carried on from animal to animal usually gave positive results. It is of importance to notice, however, that a condition clinically comparable with trachoma was observed in none of the experimental animals. Histological investigation merely showed that the conjunctival follicles of the inoculated eye were somewhat more voluminous than those of the sound eye.

The authors conclude that in Paris many cases of the non-gonococcal ophthalmia of babies are due to a special infection characterised by the presence of epithelial inclusions, analogous to those of trachoma. The experimental inoculation of the eyes of *cynocephalus* with these bodies sets up a moderate reaction which lasts for a few weeks only.

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VII.—TRACHOMA, AND ITS COMPLICATIONS.

(1) **Benson, Arthur H.—Concerning trachoma.** *Dublin Journal of Medical Science*, January, 1910.

(1A) **Schiele, A.—On trachoma in the new-born.** (Ueber "Trachom" bei Neugeborenen.) *Wochenschrift f. Therapie u. Hygiene des Auges*, April 14, 1910.

(2) **Brav, Aaron.—The social and clinical aspects of trachoma.** *American Medicine*, August, 1910.

(3) **Eaton (Portland, Oregon).—A theory of the etiology, prevention, treatment, and cure of trachoma.** *Ophthalmic Record*, August and October, 1910.

(4) **Zade, M.—Contribution to the knowledge of the corpuscles of trachoma and of their appearance.** (Beitrag zur Kenntnis der Trachomkörperchen und ihres Vorkommens.) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXVII, Heft 1, 2 Oktober, 1910.

(5) **Junius.—Researches upon the ætiology of trachoma.** (Untersuchungen zur Aetiologie des Trachoms.) *Zeitschrift für Augenheilkunde*, November, 1910.

(6) **Bey, Sameh.—Corneal symblepharon consecutive to trachoma.** *La Clinique Ophtalmologique*, 10 décembre 1910.

(7) **Noguchi, H. and Cohen, M.—The relationship of the so-called trachoma bodies to conjunctival affections.** *Archives of Ophthalmology*, January, 1911.

(8) **Junius. — On the ætiology of trachoma.** (Zur Ætiology des Trachoms.) *Zeitschrift für Angenheilkunde*, Februar, 1911.

(9) **Farhat.—A note on the cases of trachoma seen in the ophthalmological department of the Lariboisière between 1903 and 1910.** (Note sur les cas de trachome observés dans le service ophtalmologique de Lariboisière de 1903 à 1910.) *Ann. d'Oculistique*, février, 1911.

(10) **Coudray.—The geographical distribution of trachoma in France.** (La répartition géographique du trachome en France.) *Ann. d'Oculistique*, juin, 1911.

(1) **Benson,** of Dublin, recapitulates, often in a distinctly humorous vein, some points in the history of trachoma and its still to be sought cause, with the view of stimulating those who have the time and energy to undertake research work on its ætiology. In connection with the question of time, the writer aptly quotes Dr. Samuel Johnson's famous *dictum*:—"What we think of importance we wish to do well; to do anything well requires time, and what requires time commonly finds us too idle or too busy to undertake it."

ERNEST THOMSON.

(1A) **Schiele** reports that he found "trachoma bodies" nine times, and gonococci eight times, in ophthalmia neonatorum during nine months. The inflammation appeared as early as the third day, and varied in different cases between then and the tenth day. An investigation was then carried out of the bacteriology of the conjunctiva in eighty infants within eight days of birth. "Trachoma bodies" were discovered in seven cases, two of which were characterised by moderately severe ophthalmia, while the remaining five cases were comparatively mild. The same germs were found in the lochia of two of

the mothers. Gonococci occurred twice, and pneumococci once. Trachomatous conjunctivitis, as seen in the above cases, had less swelling of the eyelids, a more mucoid discharge, and the cornea was less endangered, although it suppurated in two of the cases. The incubation period is usually eight days, and while gonorrhœal ophthalmia runs a course of from four to six weeks, the trachomatous form lasts several months. W. B. INGLIS POLLOCK.

(2) **Brav** (Philadelphia).—This paper follows the usual trend of such articles. The author thinks that the American laws excluding trachomatous aliens are too severe. T. HARRISON BUTLER.

(3) **Eaton's** contributions on the above subject apparently began in 1908, when he contributed a preliminary report in the September number of the *Ophthalmic Record* in the form of ten theorems.

In the present articles he devotes a good deal of space to the history of trachoma in Egypt, Europe, and America, and quotes largely from the reports of Swan Burnett, Chibret, and others on the subject. Chibret concluded, from evidence obtained from Eaton and other American contributors, that the Canadian Indians were absolutely immune from trachoma, and that the American negroes and the Celtic race were relatively immune. Eaton has never seen a case of trachoma in a negro, and the only occupations which he has found to favour trachoma are those of farmers, cattlemen, and stablemen. These last seem to to be the most affected. This fact, followed by a case which appeared to be trachoma following a flybite on the lower lid, seems to have suggested to the author that certain "gad-" or horse-flies are, and always have been, the principal factors in the origin and dissemination of trachoma.

The primary host of the exogenous parasite is the horse, and probably other animals and birds. The intermediary hosts are certain biting gnats and possibly other insects. The final host is the human body. The tabanidæ (horseflies) are the chief intermediary hosts, and the muscidæ (house and stable flies) are the disseminators, possibly also intermediary hosts. The species of fly which he believes is the principal host of the trachoma protozoon is the *Tabanus atratus* Fab. "Probably this is the largest species in the family, and it is certainly one of the most conspicuous, being quite common and of such a decidedly black colour as to attract attention either on the wing or when perched on the back of some animal that tries in vain to drive it off" (Osborne). The adult fly is an inch or more in length, black throughout the back of the abdomen, covered with bluish-white bloom, and the wings are smoky black. The larvæ are semiaquatic, being at home either in moist earth or water. The author brings forward historical, geographical, and geological facts to show that the low, sandy plains and river bottoms of Egypt (ancient and modern) and the State of Illinois ("little Egypt") are favourable to the existence of the larvæ of these flies, and therefore account for the prevalence of trachoma in these parts of the world. This is in keeping with the fact that trachoma is as rife in sparsely populated country districts as in overcrowded cities.

The author believes that trachoma is primarily a blood infection, of which the anæmia, debility, cachexia, mental dulness, and depression are signs. He also is of opinion that follicular conjunctivitis is the early, oft locally curable, stage of trachoma, and reacts like trachoma to local applications of tuberculin (ophthalmo-reaction). This reaction to horse-serum, he thinks, is due to the presence in the blood of some toxic substance which is the main, if not the sole, factor in bringing about the local reaction. Goldzieher also claims that trachoma is a disease due to an unknown irritant localised in the vascular layer of the conjunctiva; the initial lesion being in the vessel wall, the adventitial cells of the vessels produce a profuse lymphocytosis, which

forms the inflammatory granulomata—clinically trachoma nodules. The term "adenoid" for the so-called follicular formation is accordingly incorrect, as the vessel is the essential element.

In the production of conjunctival secretion and the dissemination of trachoma a mixed infection, especially with gonococcus, Koch-Weeks' bacillus, and Morax-Axenfeld bacillus, plays an important part.

In the matter of treatment the author's suggestions are rather vague. He advocates the *natural* raising of the opsonic index by any treatment (other than by vaccines and antitoxin injections) or hygienic measures which will stimulate more especially the internal secretions (ductless glands).

In the matter of prevention, he advocates the use of crude Californian coal oil (which banishes all flies) on the soil of districts in which trachoma is prevalent. J. JAMESON EVANS.

(4) After examining 25 cases of trachoma in the eye clinic of Jena, **Zade** finds typical chlamydozoa in 10 cases, doubtful in 5, and negative in 10. The corpuscles disappear readily under treatment, and are scanty if a relapse similar to fresh infection takes place. They have never been found in anything but trachoma. R. GRUBER.

(5) Halberstädter and v. Prowazek, as well known, discovered cell inclusions in the epithelial cells of the conjunctiva of trachoma patients which they called "chlamydozoa." These they regarded as the active agents which caused the disease. The plastin caps, which surrounded the nucleus in these cells, they considered to be reaction products of the cell. Trachoma, according to these authors, is essentially an epithelial disease, the changes in the connective tissue and adenoid tissue and the follicles are merely secondary manifestations. They point out that Peters has described follicle-free trachoma, and that follicles are not pathognomonic of trachoma. This view has not been accepted by Greeff, who has now some doubt as to whether the cell inclusions really represent the micro-organisms which cause trachoma. Heymann has found similar cell inclusions in gonococcal conjunctivitis, and others have detected them in spring catarrh. v. Prowazek accepts Heymann's discovery, which has been fully confirmed by other investigators, but to explain them, he postulates a non-gonococcal ophthalmia neonatorum caused by a chlamydozoon. He forgets that Heymann found gonococci in his cases as well as chlamydozoa!

Lindner goes even further, talking of a trachoma of nursing infants, caused by these cell inclusions. He described a peculiar method of division of the *initial forms* of trachoma at last year's Ophthalmological Congress (Heidelberg). These are originally the size of red blood corpuscles. These he regards as the free initial forms of the Prowazek bodies. Herzog thinks that the cell inclusions are really involution forms of the gonococcus, micro-gonoccoci.

Junius, of Cologne, holds very strongly that the adenoid tissue forms the essential basis of the disease. The exciter of the disease must be sought here, and not in the epithelium, although it must enter the deeper tissues by way of the epithelium. He has carried out an investigation of this tissue, using the hanging drop method with a warm stage. A piece of conjunctiva is snipped from a fresh case of trachoma, and pinned down to a piece of sterilized cork. The deeper tissues are carefully conveyed to a cover slip which is placed on a hollowed slide, sealed up, and kept at the body temperature. The cells studied are divided into fifteen groups and are illustrated by plates which accompany the paper.

The most important points are.—(1) Cells which for the most part do not correspond with the usual forms of granulum cells. (2) Vesicle formation in

these cells which at a definite time separate from the mother cell and develop further in a free state. (3) Living heterogeneous forms in a free state. (4) Similar, but non-mobile forms in many cells. These from want of full knowledge, are still described as "nuclear-like." The dead cells were examined after the tissue in the hanging drop had died, and were compared with stained and fixed preparations. He concluded that the vesicles could develop in all kinds of cells and that they left the cells at a very definite time, became independent organisms, and developed further outside the cells. That often two free vesicles remained together for a still longer time, but during this time underwent a different form of development. He determined with certainty that these micro-organisms are not bacteria but more highly organized forms, and that they are so numerous in trachomatous tissue that they must be held to have some connection with the disease. Junius does not commit himself to the view that these bodies are the essential cause of the disease. The only certainty is that they exist in the granulum and become parasitic. T. HARRISON BUTLER.

(6) Adhesion between the cornea and the tarsal conjunctiva is quite rare. Such anterior symblepharon of trachomatous origin has never, to the author's knowledge, been described. During 19 years of practice in Cairo **Sameh Bey** has observed this complication only 7 times out of 17,515 private cases (·004 per cent.) and 25 times out of 338,359 cases in public practice (·007 per cent.). After giving a brief account of ten cases of anterior symblepharon due to causes other than trachoma the author proceeds to his subject proper.

In the trachomatous variety of anterior symblepharon the adhesion takes place, either spontaneously in individuals suffering from an inflammatory attack, or as the result of improper intervention by quacks, in the course of these attacks or in the intervals between them. In these cases the adhesion comes about through direct contact between surfaces denuded of epithelium. In particular, it happens that the epithelium of the upper part of the cornea and of the upper tarsal conjunctiva exfoliate owing to the inflammatory process. These two parts, thus laid bare and at the same time immobilized by occlusion of the eyes, end by uniting together. At first, one finds between the two surfaces a thick, fleshy cicatrix. Later, this takes on a tendinous appearance. This cicatrix of itself prevents the lid from being everted, but if the latter be raised up it can be seen that the cicatrix is especially developed at the upper part of the tarsus and stops three or four millimetres above the free border of the lid. As regards the cornea, it covers the upper part thereof. Sometimes it is sufficient forcibly to evert the lid, in order to rupture this adhesion and to allow the cornea gradually to recover its normal aspect. In other cases a difficult dissection is necessary.

The adhesion always spares the centre of the cornea opposite the pupil. It seldom goes beyond the upper limbus.

The author then relates his treatment of three cases out of the thirty-two which he has collected. ERNEST THOMSON.

(7) This report is the result of the examination of 10,000 smears and sections. **Noguchi** and **Cohen** find the so-called trachoma bodies uniformly absent from the normal conjunctiva of the new-born, in acute or chronic catarrhal conjunctivitis, in conjunctivitis due to foreign bodies on conjunctiva or cornea, or associated with measles, scarlatina, and diphtheria, in conjunctivitis due to atropine, in vernal catarrh, and in folliculosis conjunctivæ. They consider that this fact disproves the theory that the bodies are merely the result of local irritation. In conjunctivitis follicularis, the bodies were present in only nine of 250 cases. In trachoma, blennorrhœa neonatorum non-gonorrhoica, and in blennorrhœa gonorrhorica in children, the bodies were frequently but

inconstantly present. The authors conclude that "the finding of the bodies in the conditions mentioned above suggests to us the hypothesis that the so-called trachoma bodies represent an etiological factor in an independent conjunctival affection which is not complicated by pannus or cicatrisation and which clinically resembles trachoma with acute manifestations or the papillary stage of blennorrhœa gonorrhoica. On this hypothesis the presence of the so-called bodies in trachoma and in blennorrhœa gonorrhoica is to be interpreted as the result of the engrafting of the disease caused by these bodies on the original affection." There are five illustrations of trachoma bodies. ROSA FORD.

(8) **Junius,** of Cologne, gives a further account of his researches upon the cytology of trachoma tissue. The paper does not lend itself to abstraction, nor would it be possible to make the text intelligible without the plates which accompany it. Even with the plates, it is rather difficult to follow the author. T. HARRISON BUTLER.

(9) **Farhat** gives an analysis of the cases of trachoma treated at the Lariboisière since 1903, when Morax was appointed to take charge of the ophthalmological department there. He finds the number of patients coming from foreign parts has increased, while there has been a decrease in Parisians suffering from the disease. He also finds that the proportion of patients coming from the various *arrondissements* differs from that which obtains at the Quinze Vingts as ascertained by Chatemesse and Valude,* and considers that if the statistics of all the hospitals were collected, it would be found that the distribution of the disease in the various districts was equal. R. J. COULTER.

(10) **Caudray** has made an exhaustive investigation of the geographical distribution of trachoma in France, and finds that its prevalence in the different parts of the country varies much. The disease is common in the frontier districts and those bordering on the Mediterranean, the south, and the south-west, but is rare in the centre, the west, and the north-west. Most of the patients are of foreign origin, Belgians, Spaniards, Italians, and Algerians, while the indigenous cases do not show any infective tendency. As the tendency of the disease to spread among the native population is slight, the author considers that it is unnecessary to exclude immigrants suffering from trachoma, but that attention should be directed to improving the conditions under which they live. R. J. COULTER.

VIII.—THE INOCULATION OF TRACHOMA.

(1) **Nicolle, Ch., Cuénod, A., and Blaizot, L.—An experimental study of trachoma (granulous conjunctivitis). [Etude expérimentale du trachome (conjonctivite granuleuse).]** *Annales d'Oculistique*, juin, 1911.

(2) **Morax, V.—A note upon the inoculation of trachoma in monkeys. (Note sur l'inoculation du trachome aux singes.)** *Ibidem.*

* *Bulletin de l'Académie de Médecine*, avril, 1909.

(1) **Nicolle, Cuénod,** and **Blaizot** detail their experiences in the endeavour to transmit trachoma experimentally to monkeys.

With *Macacus sinicus* the results were, upon the whole, unsatisfactory. With the chimpanzee, however, matters were different. Inoculation from a recent case of trachoma in a child, whether carried out by scarification or injection of the palpebral conjunctiva, led, after an incubation of a week, to the development in the chimpanzee of trachoma granulations precisely comparable with those of the human disease. Neither inflammation nor secretion was present. The granulation commenced to regress about one hundred days after inoculation. Cure was not complete when the observation was brought to an end on the one hundred and sixtieth day. The microscopical examination of smears from the granulations, carried out on several occasions, disclosed the existence of the Prowazek bodies.

The costliness of chimpanzees for experimental purposes led the authors to endeavour to find out some plan whereby the resistance of ordinary apes to the virus of trachoma could be overcome. This they tried to effect—first, by repeated virulent inoculations; and, secondly, by passing the virus through the chimpanzee. The first method yielded no appreciable results. But a good reaction was produced by the second method when the material was taken from the chimpanzee on the eighth day, although on the thirty-sixth day the results were negative. That this was not due to attenuation of the virus was shown by the fact that a chimpanzee inoculated from another chimpanzee on the one hundred and eighth day contracted a typical trachoma. It is therefore clear that the activity of the virus for the ape can be enhanced by passing it through the chimpanzee, although the disease thus experimentally produced is not identical with the human malady.

Incidentally, the authors bring out the several facts that scarification is the best means of realising infection of the monkey's conjunctiva, and that trachoma in the chimpanzee, although insidious in its onset, remains inoculable for considerable periods of time. SYDNEY STEPHENSON.

(2) **Morax,** of Paris, describes the results obtained by him since the year 1905 by inoculating the eyes of monkeys with the virus of trachoma. Despite the number of inoculations practised, he obtained one positive result only, the details of which he now gives. As the experiment was made in the year 1905, prior to the discovery of epithelial inclusions by Prowazek and Halberstaedter, so-called "trachoma bodies" were not searched for. Facts follow.—The tarsal conjunctiva of a child affected with unilateral trachoma was scarified, and the operation was at once repeated upon the healthy conjunctiva of a dying patient with the same uncleansed instrument employed in the first instance. The patient died nine days after the inoculation without conjunctival lesions, macroscopic or microscopic. A morsel of tarsal conjunctiva was next excised from the eye of the original patient, and divided into three pieces, two of which were prepared for microscopical examination, and the third, after having been ground up (*broyé*) with sterile sand, was inoculated into the conjunctival sacs of a chimpanzee and an orang-outang. After an incubation period of from nine to fourteen days, the former animal showed an outcrop of follicular lesions, encroaching upon the tarsal conjunctiva and the upper *cul-de-sac*. The lesions were receding when the chimpanzee succumbed to some general ailment thirty-eight days after the inoculation. In the case of the orang-outang no reaction was obtained. SYDNEY STEPHENSON.

IX.—REMEDIES.

(1) **Friebis (Philadelphia).** — **Report of recovery from chronic sympathetic ophthalmitis with normal vision.** *Ophthalmic Record*, April, 1910.

(2) **Dean.—A few notes on ophthalmic surgery.** *Ophthalmic Record*, June, 1910.

(3) **MacGillivray, Angus.—The treatment of trachoma-granular conjunctivitis.** *Edinburgh Medical Journal*, March, 1911.

(4) **Marmoiton, C.—Ephedrine.** (L'Ephedrine.) *La Clinique Ophtalmologique*, 10 mai, 1911.

(5) **de Ridder.—The action of "Salvarsan" in sympathetic ophthalmia.** (A propos de l'action du Salvarsan dans l'ophtalmie sympathique.) *Annales d'Oculistique*, juin, 1911.

(6) **Wicherkiewicz. — Novoïodine as an ophthalmic remedy.** (La Novoïodine comme remède ophtalmique.) *Revue Générale d'Ophtalmologie*, 30 juin, 1911.

(7) **Domec, Th.—Some uses of Steresol in ocular therapeutics.** (Quelques applications du Stérésol en thérapeutique oculaire.) *La Clinique Ophtalmologique*, 10 juin, 1911.

(8) **Morax and Fourrière.—On modification in the intraocular tension in glaucoma occurring in syphilitics after treatment with arsenobenzol.** (Modification de la tension oculaire dans le glaucome chez des syphilitiques après traitement par l'arsénobenzol.) *Ann. d'Oculistique*, juin, 1911.

(9) **Thomas, Hayward G.—On the relief of glaucoma by subconjunctival sodium citrate injections.** *Journ. of Ophthalmology and Oto-Laryngology*, July, 1911.

(1) **Friebis'** patient, a young man twenty years of age, developed sympathetic ophthalmitis some four months after injury to the exciting eye. In addition to the ordinary signs of chronic iridocyclitis, the iris in more than half of its circumference was atrophied and distended in the form of a vertical crescent by fibrino-plastic exudates. The central portion of the lens was clear. Vision = 15/200. No pathological change was visible beyond a very small atrophic patch near the edge of the disc. The exciting eye was excised soon after the development of signs of sympathetic inflammation.

The case was treated by a preliminary calomel purge, then mercurial inunctions, hot moist compresses, sweat baths three times weekly, atropine and dionin drops, and occasional blistering of the temporal region. Potassium iodide was given in ascending doses until the stomach revolted at sixty *drops* (? grains), and it was then replaced by sodium salicylate, which was well borne and gave excellent results.

After ten days' treatment, V. = 15/50,and three months later, vision and field were normal. J. JAMESON EVANS.

(2) **Dean,** of Scranton, Pa., often employs the galvanic current (four to six cells) to reduce tension in cases of moderate glaucoma superinduced by eyestrain.

In pterygium he dissects the diseased tissue back to its base, then makes

a vertical incision of the conjunctiva near its corneal attachment, draws together the horizontal edges of the conjunctiva, and covers the area previously occupied by the pterygium and completes the operation by burning the growth off at its base by means of the wire loop of a galvano-cautery snare.

In operating for hyperphoria he finds that the condition returns if the operation is performed on the superior rectus, but is not liable to do so when the operation is performed on the inferior rectus of the opposite eye.

In septic corneal ulcers, he uses carefully localised applications of pure peroxide of hydrogen in preference to the cautery. J. JAMESON EVANS.

(3) The treatment of trachoma adopted by **MacGillivray**, of Dundee, consists in expression of the granules, followed at the same sitting (if one may use such an expression for an operation under anæsthesia), by the forcible rubbing into the conjunctiva of a 1 in 500 solution of perchloride of mercury. On the following day and afterwards, the eyes are freely bathed with 1 in 4,000 mercury solution. After a few weeks, when the inflammatory symptoms have subsided, the daily treatment of the conjunctiva with solid copper sulphate is commenced, and kept up for several months. ERNEST THOMSON.

(4) **Marmoiton** has been impelled by the very slight accounts of ephedrine given in the text-books to collect information about this mydriatic.

The following are the principal facts.—Ephedrine is the alkaloid of *Ephedra vulgaris* (var. *helvetica*). Its chemical constitution corresponds to the formula $C_{10}H_{15}NO$. It forms a chlorhydrate with HCl. Pseudo-ephedrine, from a different species, is an isomere. Inert ephedrine, $C_{13}H_{19}NO$, is the alkaloid of *Ephedra monasticha*.

We may omit the botanical classification, and pass on to the therapeutic action of these drugs. It seems that opinion has been considerably divided as to their toxicity and mydriatic action, owing to the fact that given samples of drug may have contained more or less, on the one hand, of the more powerful pseudo-ephedrine, or, on the other hand, of the inert ephedrine. In any case the action of ephedrine proper seems to be pretty slow. Pseudo-ephedrine is a more energetic mydriatic. Pupil dilatation with the latter is produced in about half an hour by several instillations of a 10 per cent. solution. There is no alteration of the accommodation and the light reflex is retained. There is no alteration of sensibility, and no irritation even after prolonged use. The pupil returns to normal in from six to nine hours.

The action of ephedrine is notably increased by the addition of a small quantity of homatropine, and Merck (of Darmstadt) puts up a preparation under the name *Mydrine*, which is composed of one part of homatropine to one hundred parts of ephedrine. Groenouw has found that the instillation of a few drops of a 10 per cent. solution of *Mydrine* causes a mydriasis which commences in from eight to nine minutes and is at maximum in from thirty to thirty-five minutes. After remaining stationary for half an hour, the mydriasis commences to decline and has completely passed off in from four to six hours. There does not seem to be any sensible action on the accommodation, but there may be a slight sensation of smarting, at any rate according to Groenouw, when the chlorhydrates of the two drugs are employed.

"The properties of ephedrine, of pseudo-ephedrine, and of mydrine, which have a rapid and brief action, which do not sensibly affect accommodation, which do not raise the ocular tension and only cause slight and transitory defect of vision, lead to the classification of these drugs among those mydriatics for use in ophthalmoscopic examination. But euphthalmine possesses the same properties and seems to be superior to them in several points of view. It may well be asked if there is any real advantage to be gained in introducing

or keeping these preparations among our usual diagnostic methods." The author, however, does not seem to indicate in what exact respects euphthalmine is superior to them. ERNEST THOMSON.

(5) **de Ridder**, of Brussels, after glancing at the cases of sympathetic ophthalmia treated by "Salvarsan" by Fleischer, Flemming, and Siegrist, gives details of a patient who made a good recovery after the intra-muscular injection of 60 centigrammes of "606," followed by a series of subcutaneous injections of pilocarpine and subconjunctival injections of sublimate. By the author the good result is attributed to the "Salvarsan."

SYDNEY STEPHENSON.

(6) **Wicherkiewicz,** of Cracow, writes enthusiastically, and as one who is quite sure of his ground, on the value of a new product called novoïodine. Pyoctanin has hitherto been this writer's favourite antiseptic application in eye cases, but novoïodine is very much better than protargol, sophol, xeroform, or pyoctanine. Novoïodine is a chemical combination of iodine and formaldehyde, biniodide of hexamethylene-tetramine ($C_6H_{12}N_4I_2$) or rather, the patent name "*novoïodine*" is given to a mixture of the above with talc. It is a small-grained, light brown, inodorous, amorphous powder. In contact with exudates and pus, it separates into its chemical constituents, iodine and formaldehyde. Its employment to the conjunctiva in its original form is very painful, but now Wicherkiewicz has the drug made up as biniodide of hexamethylene-tetramine mixed with powdered white sugar in proportions from 5 to 25 per cent. With this there is scarcely any pain or irritation. We need not go in detail into all the author's cases. It will suffice to say that he has had very great satisfaction in the use of this remedy in wounds of the eyelids and eyeball, in microbic infections of severe type, such as gonococcic and pneumococcic infections, and, in particular, serpent ulcer of the cornea, lacrymal suppuration, etc.

Novoïodine is not soluble in any known liquids, but a good suspension can be made in olive oil or in glycerine. Novoïodine gauze can be used for packing an abscess cavity. It may, one gathers from the article, be used as an ointment or as an ointment with novocaine; but when employing it for corneal and conjunctival conditions, the author seems to pick up the powder of novoïodine, or rather novoïodine with sugar instead of talc, on a vaselined glass rod, by means of which it is inserted under the eyelid.

If all the good that Wicherkiewicz has to say about this remedy be confirmed by other observers, we seem to be on the fair way to a revolution in the treatment of a number of highly dangerous ocular infections.

ERNEST THOMSON.

(7) Steresol is a kind of antiseptic varnish for application to cutaneous or mucous surfaces, invented by Dr. Berlioz, of Grenoble. In this interesting article **Domec,** of Dijon, gives an account of how he has used this preparation, at first sight unsuitable for the purpose, in ocular therapeutics. The following is the composition of Steresol :—

Purified gum-lac completely soluble in alcohol	270 grms.
Purified benzoin ,, ,, ,, ...	10 ,,
Balsam of Tolu	10 ,,
Crystallized carbolic acid	100 ,,
Essence of Chinese cinnamon	6 ,,
Saccharine	6 ,,
Alcohol 90% to make a litre of liquid	q.s.

(Note.—The original says Alcohol 90° which the reviewer has interpreted as above).

At first sight one is struck by the large proportion of carbolic acid, and fears that it may prove too caustic. But, as a matter of fact, it is not so. Alcohols in general enormously diminish the causticity of carbolic acid, and *vice versa*. By analogy with other solutions, the author believes that saccharine also contributes to the diminution of the causticity of steresol. In any case, prolonged experience with it has shown him that the treatment is quite bearable and that it is safe. In rare cases, smarting may continue for twenty-four hours.

Domec apparently uses the preparation in traumatic ulcers of the cornea, in which case the application is made direct to the ulcer, but the chief use of it is in the isolation of the cornea and the bulbar conjunctiva from the palpebral conjunctiva, while keeping the latter in prolonged contact with a powerful and not dangerous antiseptic. Suppose one wishes to reach the upper *cul-de-sac*, the eye is first cocainised and adrenaline applied. The lid is everted and painted with a very thin coat of steresol by means of a probe dipped in the latter. *The lid must not be allowed to close until the smarting, which is rather severe for a few seconds, has completely passed off* at the end of one or two minutes. The patient must not open his eyes again for five to ten minutes, and in some cases it is better to apply a dressing until next day's application. In making the application, the eyelid may either be rolled round a forceps or the lower lid may be slid under the upper in order to protect the globe. If some such precaution be not taken, the pain is much more severe. Further, it is advisable to dry with cotton the surface which is to be varnished, in order to get the maximum adhesion of the steresol. Nevertheless, whatever care one takes, but especially if no dressing has been applied, it becomes detached gradually in the form of yellowish particles, so that after twenty-four hours, as a rule, only a little of it remains adherent, except in cases where the conjunctiva is ulcerated. It remains in place, however, sufficiently long to produce remarkable effects.

Having given the important points in the author's method of application, in order that others may follow out the treatment, it will suffice here to say that Domec has used steresol in this way with much satisfaction to himself in granular conjunctivitis, follicular conjunctivitis, in which it acts better than the ordinary collyria, though rarely proving curative, and in spring catarrh, a disease in which the symptoms are relieved and relapses are prevented, although the tarsal *plaques* remain apparently unchanged. The action of steresol on granular pannus is sometimes surprising.

Domec apparently makes his application of steresol daily for a number of days, which, of course, varies with the case. So also in septic corneal ulceration the treatment is carried out daily for eight or ten days, a bandage being always applied. The resulting corneal opacities usually are insignificant.

ERNEST THOMSON.

(8) **Morax** and **Fourrière**, of Paris, report three cases of glaucoma in which injection of salvarsan was followed by diminution in the intraocular tension much greater than that obtained by the use of pilocarpin and eserin, or even by sclerecto-iridectomy (Lagrange's operation), although the effect on the eyes on which the operation had been performed was greater than on the non-operated eyes of the same patients. These good results were obtained in cases not of primary glaucoma but of persistent grave hypertension occurring in patients suffering from irido-cyclitic or choroido-retinitic lesions probably of syphilitic origin. Although the authors have seen the tension beneficially influenced by mercurial treatment in similar cases, they have never seen such a reduction in it as followed the injections of arseno-benzol.

R. J. COULTER.

(9) **Thomas**, of Oakland, California, has treated eleven cases of glaucoma (nine primary and two secondary) by the subconjunctival injection of from five to fifteen drops of a 4·05 per cent. to 5·41 per cent. aqueous solution of pure crystallized sodium citrate.* The effect of the remedy in reducing intra-ocular tension is stated to have been "unfailing." No complications were observed. Relief to symptoms lasted from three days to several weeks after each injection. It may be noted that in using sodium citrate for the relief of glaucoma, Thomas found that "lenticular opacities cleared up remarkably."

SYDNEY STEPHENSON.

BOOK NOTICES.

A Treatise on the Diseases of the Eye. By JOHN E. WEEKS, M.D. Pp. 913. 528 illust. and 25 full page colour drawings. London: Henry Kimpton. 1911. Price 30s. net.

In the preface to his work, Dr. Weeks shows that he has designed it to suit alike undergraduate, practitioner, and specialist in ophthalmology. Now, this is a very high standard to set and one particularly difficult to attain!

On the whole, we may say that the author has succeeded in producing a volume which, whilst it will probably be too large for the student, will certainly contain all that he wants, and which will be suitable for and helpful to the general practitioner, and, lastly, will contain guidance for the specialists.

The first and second chapters, dealing respectively with development and anatomy, are copiously illustrated, and are well done in all respects. Then follows a chapter on elementary optics which gives, clearly and succinctly, an idea of the action of lenses upon light waves. The optical principles underlying skiascopy, ophthalmoscopy, etc., are considered in this section of the work.

Thereafter follow chapters dealing with the examination of the eye, diseases of the various structures, movements of the eyes, ocular conditions connected with general diseases, operations, special remedies, and bacteriology.

Briefly, it may be said that the book is very well worked up in every respect. It contains a great deal of information, and in some respects many innovations. The chapter on diseases of the conjunctiva, for instance, shows evidence of desire to place the various conditions before the reader in the light of bacteriological research. Thus a list of "Forms of conjunctivitis in which the etiological factor has been determined" is separated from trachoma and other forms.

Similarly, those diseases of the cornea due to a well-defined organism are, as far as possible, brought together. Another innovation is that the author mentions briefly (very briefly sometimes) unusual conditions at the end of each chapter, merely putting them on record, as it were. This is useful, especially as many references are given.

The illustrations are distinctly good, and many of them are quite new. The printing is clear and on good paper.

There are several minor errors which should be noted for correction in a second edition. Especially is this true as regard names of writers, such as "Gun" for Gunn, "Tyrell" for Tyrrell, "Jager" for Jaeger, "Brudenell-Carter" with a hyphen. There are a few points which might be looked into also, such as the mention of one of the more recent specula used for distending the wound in

*For abstracts dealing with this symptomatic remedy for raised intra-ocular tension, see THE OPHTHALMOSCOPE, Vol. VIII, 1910, pp. 298 and 919.

operation for excision of the lacrymal sac. That of Bishop Harman is not mentioned even. Albinism as a condition is not mentioned, although distinctly interesting from the refraction point of view. Many recent mydriatics escape notice also, whilst deserving of trial; and the peculiar form of dermatitis which follows the use of preparations of belladonna in some persons is omitted. "*606*" is not mentioned.

Generally speaking, however, it may be said that there is little of importance left out of the work, and that, as it is only in its first edition, it is distinctly a success. LESLIE BUCHANAN.

Bulletin de la Société Belge d'Ophtalmologie. No. 30. Bruxelles: L. Severeyns, 34, Rue Botanique. 1911.

This slender paper-backed volume contains an account of the communications read at the thirtieth meeting of the Belgian Ophthalmological Society at Brussels on May 14th, 1911. The next meeting of the Society, we note, is to be held at Charleroi.

Smith's Cataract Operation. By DERRICK T. VAIL, M.D., Cincinnati, Ohio, U.S.A. The Lancet-Clinic Publishing Company. 1911.

In an interesting and pleasantly-written little book, Dr. Vail essays to give a "full and accurate" description of 'Jullundur Smith' as a cataract operator in his Indian clinic. The reviewer was at Jullundur with Dr. Vail, and can bear him out in his statements of fact, surprising as some of them may seem to the ordinary reader. Indeed, the author, has kept well within his facts; for example, he has omitted to state that throughout his operations, Smith vigorously smokes a long cheroot, and invites his visitors to do likewise. All who have met Dr. Vail know him as a shrewd observer, an honest, capable ophthalmologist, and a very kindly character. Not a few of the inferences drawn in the book, must, we think, be attributed to his heart rather than to his head.

The opening description of Smith's methods of diagnosis and of selection of cases has never before, we believe, been set down in cold print by a visitor. It deserves careful study. The case is certainly not overstated, as may be judged from the fact that Smith claims to be able to diagnose intra-ocular disease without the aid of an ophthalmoscope. Before the reader has closed the book, Dr. Vail has left on his mind the subtle suggestion that mistakes are avoided by Smith's "unusual diagnostic ability." But the reviewer is not alone in his belief that an unusually large number of mistakes, some of them bad ones, must be, and are, made under the Jullundur conditions. It is only fair to remember that Smith does a large amount of valuable clinical work, which a surgeon working on more scientific lines would not and could not do. The net result has been, that whilst his name is a talisman in the Punjab, where he is both loved and revered by all classes of the people, his statistics have not carried much weight with ophthalmologists, either in India or in Europe.

Dr. Vail describes Smith's method of removing superfluous fluid by means of his finger or thumb (pp. 17 and 39-40). To the reviewer, who likewise watched the manœuvre on a number of occasions, the method appeared surgically indefensible, and he gathers that, in his inmost heart, the author shares that opinion. What is the term "finger capillary sponge" meant to convey (p. 17)? Dr. Vail appears to be very vague as to the meaning of the term "capillary attraction," which he uses in the same paragraph. Dr. Vail quotes Smith's opinion "that ambidexterity is spectacular, and practised for effect"; it is

doubtful whether Smith would really defend so flimsy and misleading an argument. Why does Dr. Vail imitate Smith in the use of such a term as "ciliary ridge" (p. 50)? The expression has no anatomical significance. The phenomenon under reference is presumably due to the scleral ring. Under the heading of "securing the capsule" (p. 70), Dr. Vail quotes Smith's statement "that he would rather lose one-third of the vitreous than leave capsule behind," etc. This appears to the reviewer to be a very damning criticism of the method. Does Dr. Vail use the term "calcified" correctly at the bottom of page 70? It seems possible that he does not. On page 73 he says "vitreous will not present or escape, when the patient looks down to the very limit, provided the lower lid is fully retracted"; This observation is contrary to the reviewer's experience. Dr. Vail gives in detail Smith's method of performing an iridectomy (pp. 35 to 39), and later (pp. 77 and 78) he states that the key-hole pupil was the exception. The reviewer considers Smith's modification greatly inferior to the ordinary method of performing iridectomy, which enables a surgeon of moderate skill safely to obtain key-hole pupils in the vast majority of his cases, without risk to the integrity of the capsule. Dr. Vail's arguments as to the merits of Smith's method do not carry conviction to his mind.

Every word that the book contains on vitreous loss will repay critical study. At the top of page 80 we read "I saw quite a number of cases 'pop' just as the lens let go its fastenings, and an alarming amount of vitreous well up into the wounds," etc. Place this statement beside the paragraph numbered 3 on page 78, which deals with the up-drawn pupils, and the cause of the latter will be obvious to any ophthalmologist. Again, take Dr. Vail's admission on page 70 with regard to three cases of far more than ordinary interest, in which Smith was unable to remove capsule left behind, he says "it was impossible to follow them up on account of the immense amount of other more important work." Compare with this the statement "I could not notice any difference in the after-behaviour of the cases that had lost vitreous, and those which had lost none." With what care and thoroughness had he followed *these* cases up? The reviewer offers no opinion on either side of the vitreous escape question, but he loses confidence in Dr. Vail's judgment, when he finds him, on what appears insufficient evidence, making so important a statement as the following—"I think vitreous escape is not in the argument to be used against Smith's *technique*" (page 80).

Under "Accidents and Incidents," Dr. Vail at least shows that the oft-repeated claim that intra-capsular extraction is free from after-complications is not supported by facts. Our confidence in his statistics is shaken by the ambiguity of his figures. One reads with misgiving "(five or six)," "three or four cases," "perhaps a dozen cases." To do Dr. Vail justice, the fault probably lies with the system in vogue at Jullundur, which made accurate statistics impossible. That system was the outcome of Smith's peculiar conditions, in that he was endeavouring to cope single-handed with a mass of work which it would have tried ten men to do scientifically. Dr. Vail's remarks on pages 30 and 31 would suggest to most people that the obvious course was to select for intracapsular extraction only those cases which are suitable for the method.

The author gives credit to Smith for the method of conjunctival antisepsis by means of irrigation with perchloride lotion. The valuable underlying principle is H. Herbert's, and no one else has any right to claim it. It is a pity that Smith did not declare this long ago; nor is the above the only variation of the Jullundur *technique* which appears to have been borrowed, (unacknowledged) from other Indian clinics.

The book is excellently illustrated, but we cannot believe that the "operating scenes," in all their Western modernity, were taken at Jullundur. The print is good, the descriptions are clear, and the pleasant style makes reading easy. Every ophthalmic surgeon should peruse this book, be his final conclusions what they may. If we were asked to pick out one sentence more weighty than any other, our selection would be from page 33:—"I would be sorry to see all oculists undertake extraction in the capsule, sorry for the patients, as well as for the bulk of the operators, for it is not an operation for any man to undertake, no matter how successful and skilful he is, until he has learned how to do it, and how to meet the contingencies which arise. This is only learned in two ways,—first, by *experience*; second, by taking lessons" (The italics are our own). At the recent British Medical Association meeting at Birmingham an American surgeon stated that the opinion was gaining ground in his own country that intracapsular extraction was all very well for a surgeon who had charge of a large institution for old soldiers, and who could therefore get the necessary *experience*, "but that it was too risky for the average surgeon." Is this what Dr. Vail means by "experience"? If so, there is surely a patient's side to the argument.

Indeed, if we are to arrive at a fair conclusion as to the value of the Jullundur method, the terms used in the future must be scientific; dogmatic statements made on insufficient evidence must be avoided; and, lastly, careful thorough statistics, which will command the confidence of the profession, must be forthcoming. Younger men, who have tried the method, and who seem well pleased with it, are entering the arena. Amongst them are men of good scientific training, and of accurate habits of thought and expression. With them it will rest to establish or otherwise the value of this method, and to guide us as to our selection of cases for it. They need not fear their reception by the ophthalmic world, and if their case is a strong one, they will not need to complain either of jealousy or of conservatism. R. H. ELLIOT.

On Certain Ætiological Factors in Phlyctenular Disease. By HARRY HAWARD BYWATER. 1911.

In this Thesis for the degree of M.D. in the Victoria University of Manchester, Dr. Bywater makes a substantial addition to our knowledge concerning some points in the ætiology of phlyctenular disease.

Dr. Bywater's main attention has been directed towards ascertaining (1) the relationship between phlyctenular disease and tuberculosis, and (2) the connection between the same disease and staphylococci. He has also investigated a third point, namely, whether pediculosis plays any part in the causation of the ocular disturbance.

The relationship of phlyctenular disease to tuberculosis has been investigated in various ways, as, for example, by testing patients with tuberculin, human and bovine, and by searching for the tubercle bacillus in sections of excised phlyctenulæ. For the purpose first-named both the Moro and the von Pirquet tests were employed. The results obtained in sixteen patients, whose ages ranged from $3\frac{1}{2}$ to 17 years, are set forth in a table. Briefly, in every single one of the series a positive reaction was obtained both with human and bovine tuberculin. It is to be noted that in thirteen of the sixteen cases, the local reaction was somewhat more pronounced with bovine than with human tuberculin. Dr. Bywater concludes, as the results of his experiments, that the presence of some tuberculous focus is almost universal in cases of phlyctenular disease, and, further, that a bovine is commoner than a human origin.

No tubercle bacilli could be found upon the bacterioscopic examination of an unbroken phlyctenule, excised on the third day of the disease. A healthy guinea-pig, inoculated beneath the skin of the abdomen with an emulsion of a recently excised phlyctenule, succumbed after four weeks, but without showing *post-mortem* evidences of tuberculosis. This piece of experimental work, then, goes to show the absence of the tubercle bacillus from the conjunctival lesion, although it obviously does not negative a tuberculino-toxin as the cause of the eye disturbance.

Dr. Bywater next turned his attention to the possible occurrence of phlyctenular disease among 1,577 cattle, but with one doubtful exception, his investigations were sterile in that direction.

The bacteriological examination of seven cases of phlyctenulæ (four ulcerations and three unbroken phlyctenulæ) yielded no very novel results. In every instance staphylococci were discovered, although xerosis bacilli, curiously enough, were found once alone. The presence of staphylococci in the unbroken phlyctenule, however, is a fact worthy of attention. That the s.p. aureus predominated in the phlyctenular ulcers left little doubt in the author's mind that it was a causal agent, a view borne out by the happy result obtained by the treatment of two cases with an autogenous vaccine of the organism in question.

The bacterioscopic examination of pediculi capitis derived from cases of phlyctenular mischief, showed that the creatures are capable of carrying staphylococci. It is thought by Dr. Bywater that "they may sometimes supply the bacteria in phlyctenular disease, either directly or from the impetiginous sores they often cause." SYDNEY STEPHENSON.

Ophthalmic Instruments. July, 1911, No. 2. Edited by H. S. RYLAND. London: Reiner & Keeler, 9, Vere Street, W. Price 2s.

Ophthalmic Instruments, the title selected for what is described as "a bi-annual review of optical matters in ophthalmology," edited by Mr. H. S. Ryland, gives but little idea of the contents of this well-printed magazine. Thus, the present number contains, in addition to many bits of gossip on matters optical and ophthalmological, articles on the errors of spectacle lenses, fusion tests, the making of spectacle lenses, circular scotometry, the measurement of the interpupillary distance, ophthalmic illumination, test-types, lens systems, and the measurement of corneal curvature, to say nothing of Dr. E. E. Maddox's note on bifocal glasses reprinted from THE OPHTHALMOSCOPE of June last. The present number of this somewhat curiously-named magazine is distinctly interesting. SYDNEY STEPHENSON.

Tobacco Amblyopia. By STANLEY ROBSON. Thesis for the M.D. Durham, 1910.

Robson's *brochure*, which is a gold medal essay for the M.D. Durham, is essentially a review of the subject of tobacco amblyopia, and as such it is interesting. But there are some original investigations as well, and these deserve to be specially noticed.

After giving an account of the chemistry of tobacco leaves and tobacco smoke, noting the predisposing factors in amblyopia, *viz.*, age of patient, quantity and quality of tobacco, percentage of nicotine in different tobaccos, the influence of alcohol, idiosyncrasy to tobacco, gastric trouble, etc., the author proceeds to the signs and symptoms. The greatest interest in the matter, however, centres round the ætiology. Formerly, nicotine was considered to be the sole poisonous constituent, but in later years the pyridine bases were

regarded as being more harmful, whilst more recently, again, prominence has been accorded to nicotine. The physical and physiological properties of nicotine are then gone into, and the author concludes that nicotine has fully established its position as an important tobacco poison. But perhaps the significance of the pyridine bases has been under-estimated. The most important of these is pyridine. What little regarding its action has been published shows that on the lower animals it acts as a violent poison, and when inhaled by human beings, it acts as a respiratory sedative, and, in time, causes a severe headache. The lowest members of the pyridine series have been observed to produce excitement from irritation of the brain centres, while the highest cause paralysis. Our knowledge, however, is insufficient about these bases, and it is difficult to gauge their relative importance as tobacco poisons. Since they act as powerful poisons in animals, it may be assumed that they are correspondingly active in man. "They are very volatile, and if only a small proportion of the nicotine passes over in the smoke, the rest being decomposed into the pyridine bases, it seems unreasonable to assert that these bases are without any harmful influence until further knowledge is at hand with reference to their action when used in a pure state."

In recent years another constituent of the smoke, carbon monoxide, has been suggested as an injurious agent. On this subject the author carried out some interesting experiments. By aspirating the smoke from pipes, cigars, and cigarettes through a column of dilute blood, and investigating spectroscopically, he was able to prove the presence of carbon monoxide in the smoke. From the fact that carbon monoxide is actually present in tobacco smoke, and from other facts—(1) that amblyopia especially affects smokers of the pipe, where the combustion is known to be imperfect, (2) that snuffing and chewing when indulged in alone produce very few cases of amblyopia, (3) that amblyopia is uncommon among tobacco workers—Robson concludes that the gaseous elements of tobacco smoke, apart from the nicotine, play an important part in tobacco poisoning, and that carbon monoxide may well have a share in the poisoning process.

The remainder of the thesis is concerned with a review of the pathology, diagnosis, prognosis, and treatment. ERNEST THOMSON.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

THE SAEMISCH SECTION.

To the Editor of THE OPHTHALMOSCOPE.

DEAR COLLEAGUE,

The operation of Saemisch (1869) although practised by Guthrie (1843), was invented and executed in five cases (1765) by Georg Heuerman in Copenhagen (see my *History of Ophthalmology*, 429, XIV. p. 425, 1908; Gordon Norrie, *Centralbl. für Ophth.*, 1890. S. 265; Georg Heuerman, *vermischte Bemerkungen und Untersuchungen der ausübenden Arzneiwissensch.*, Copenhagen u. Leipzig, 1765, Bd. I, S. 274-276). See also Czermak's *Augenarzte Operationen*, edited by Elschnig, Bd. II, S. 67, 1908.

Very truly yours,

J. HIRSCHBERG, M.D.

BERLIN, GERMANY,
July 28th, 1911.

A MISCELLANY OF SMALL CONTRIBUTIONS.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

May I be allowed, through your pages, to thank Professor Hirschberg for the interesting information which he has given on page 608 of the August number of THE OPHTHALMOSCOPE, and which affords striking evidence of the searching knowledge of the history of ophthalmology possessed by the greatest authority on that subject.

Yours faithfully,
E. E. MADDOX.

"GLENARTNEY," POOLE ROAD,
BOURNEMOUTH.
1st August, 1911.

NOTES AND ECHOES.

Deaths.

THAT Nestor of Italian ophthalmic science, Carlo Reymond, of Turin, died on 9th July last at the age of 77 years. For nearly half a century he had been professor of ophthalmology in the University of Turin, and for a corresponding period had occupied the directorship of the eye department attached to the chair. As a teacher he was unexcelled, and his influence upon the progress and development of ophthalmic medicine and surgery in Italy can scarcely be exaggerated. It is pathetic to reflect that at the time of his demise a committee was at work to celebrate Reymond's extended period of usefulness, when death stretched out his hand and brought both work and life to a sudden close. R.I.P.

The following appreciation of Reymond has been contributed by our esteemed correspondent, Dr. A. Antonelli :—

"Professor Charles Reymond, of the University of Turin, has just died, a few months after the publication of the volume in which his pupils, his colleagues, and his friends had re-edited his various *mémoires*, in order to celebrate his fiftieth year of university life. Born at Albertville, in Savoie, on the 26th November, 1833, Reymond pursued his classical studies at Chambéry, and received his medical education at Turin. He served his apprenticeship to ophthalmology at Paris in the *cliniques* controlled by Desmarres and Sichel respectively. He returned to Turin as assistant to Sperino, who was the first incumbent of the chair of ophthalmology, founded in that city in the year 1859. Reymond replaced his master in the conduct of the course in 1873, and in 1876 as professor. During the fifty years of his university life (1861-1911), of which thirty-five were devoted to improving the *clinique* which he directed, the activity—scientific, professional, and didactic—of Reymond never relaxed. His substantial culture in all the branches of ophthalmology enabled him to inspire and to guide, according to the different aptitudes of his students, the works of what may be described, so to say, as a nursery garden of young ophthalmic surgeons, which he had gathered around him at Turin. His authority, his great influence in university circles, and his determination combined to render him all-powerful in the selection of his favourite pupils, so that, in fact, all the chairs of ophthalmology in the Italian universities are occupied by oculists who were educated at Turin. A clever operator, Reymond was among the first in Italy to apply antiseptic

principles to eye surgery, particularly in the operation for cataract. Constantly travelling, rarely missing any of the foreign congresses, he had acquired, with the help of Donders, a taste for studies in refraction, a subject which he popularized in Italy. His publications in this domain of ophthalmology were both numerous and important, a remark which also applies to other branches of our speciality, notably in the chapters dealing with toxic amblyopias, hemeralopia and xerosis, and the deeper affections of the eye." A. A.

The death is announced, at the age of 48 years, of Dr. E. Hagnauer, a well-known ophthalmic surgeon of Valparaiso, Chili.

Deaths announced from America include those of Henry L. Shaw, and Henry C. Angell, of Boston, Edward W. Fox, of Trinidad, Colo., and Harry J. Dean, of Muscatine, Iowa.

The death is announced of Dr. Dastot, of Mons, Belgium, in his 73rd year. It is sad to recall the fact that only the day before his death, the Belgian Ophthalmological Society agreed to confer upon Dastot its honorary membership.

The following sympathetic appreciation of the late Tatham Thompson was published in the July, 1911, issue of the *Edinburgh Medical Journal*:—

"Although Tatham Thompson had been away from Edinburgh for a long time, he will be well remembered by what is now becoming the older generation of Edinburgh men as one who was constantly to the front in all acts and ceremonies of good fellowship, and whose facility with his pencil and brush made him a valued cartoonist on the Liberal side at rectorial elections. Many of his drawings at these times are still treasured by those who fought alongside him. He turned his powers also to more serious use in medical illustration, and practically all the illustrations to Woodhead's *Practical Pathology* were done by him. Ophthalmic surgery was a specialty well suited to his delicate fingers, and at the time of his death he was consulting ophthalmic surgeon to the Cardiff Infirmary, and surgeon oculist to the South Wales Institute for the Blind. He wrote many valuable papers, and for many years enjoyed a large ophthalmic practice."

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Appointments.

Mr. A. H. Payan Dawnay has been appointed ophthalmic surgeon to out-patients at the Great Northern Central Hospital, Holloway Road, London, N.

Dr. T. Harrison Butler has been elected school oculist by the Coventry Education Committee.

Mr. W. M. Munby has been appointed resident ophthalmic officer at the Leeds General Infirmary.

Dr. William M. Sweet has been appointed surgeon to Wills Eye Hospital, Philadelphia.

Dr. Joseph L. McCool has been appointed an assistant ophthalmologist at the Philadelphia General Hospital.

Dr. James Thorington has been appointed ophthalmic surgeon to the Presbyterian Hospital, Philadelphia.

Dr. H. M. Langdon has been elected one of the chiefs of the eye dispensary in connection with the Presbyterian Hospital, Philadelphia.

Dr. Cords has been nominated as first assistant in the University Eye *Klinik* of Bonn.

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American Ophthalmological Society.

PROFESSOR E. FUCHS, of Vienna, was the guest of honour at the recently concluded meeting of the American Ophthalmological Society.

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Professor v. Michel.

THE widely circulated rumour of the impending resignation of Professor v. Michel is declared to be without foundation. Berlin could ill afford to lose so distinguished a master of ophthalmology.

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Ophthalmological Society of the United Kingdom.

THE following office-bearers were elected at the annual general meeting of the Ophthalmological Society held on July 13th last.

President: J. B. Lawford.

Vice-Presidents: J. C. Uhthoff (Brighton), T. H. Bickerton (Liverpool), Ernest Clarke, W. T. Holmes Spicer, Percy Flemming, G. A Berry (Edinburgh).

Treasurer: James Taylor, M.D.

Librarian: W. T. Holmes Spicer.

Council: F. E. Batten, M.D., J. H. Parsons, C. H. Usher (Aberdeen), W. W. Sinclair (Ipswich), J. Herbert Fisher, A. Hugh Thompson, G. W. Roll, A. W. Ormond, F. Menteith Ogilvie (Oxford), Lieut.-Colonel Herbert, I.M.S., G. Brooksbank James, and Gordon H. Holmes, M.D.

Secretaries: E. Farquhar Buzzard, M.D., and E. Brewerton.

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Dr. R. A. Reeve.

CONGRATULATIONS to Dr. R. A. Reeve, professor ot ophthalmology in the University of Toronto, Canada, upon whom the honorary degree of LL.D. has been bestowed by the University of Birmingham.

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American Optical Supplies in Edinburgh.

The following extract from a report by the United States Consul in Edinburgh dealing with the trade conditions in that city during the year 1910 deserves particular attention from manufacturers on this side of the Tweed:—

> "Sales of American gold-filled spectacle frames and similar fittings were large and the standard articles in this line here are frames selling for $6.45 to $9.73 per dozen to the trade. American makers have the bulk of the trade against French and German competition. There is little English competition in this

line. In the better qualities of nickel-plated goods and plain steel frames, the American trade was also better than the German or French; but in the cheaper goods the German makers had the largest share of sales. High grade lenses of American make were largely sold, but in all ordinary grades the French goods are cheaper and hold the market. There was a fair sale of American microscopes."

* * * *

Professor H. Schmidt-Rimpler.

THE golden jubilee of Professor Herman Schmidt-Rimpler, who has now attained his 73rd year, was celebrated at Halle on July 21st last. He retired from active practice towards the end of September, 1909. THE OPHTHALMOSCOPE tenders its congratulations to this distinguished exponent of ophthalmology.

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The Oxford Ophthalmological Congress.

PERHAPS the distinguishing feature of the Oxford Ophthalmological Congress, which assembled on July 13th and 14th last, was the large attendance of American members, among whom we noted Dr. Wendell Reber, of Philadelphia, Dr. S. L. Ziegler, of Philadelphia, Dr. D. T. Vail, of Cincinnati, Dr. J. L. Minor, of Memphis, Dr. C. B. Williams and Dr. J. O. McReynolds, of Dallas, Dr. H. Brown, of Reno, Dr. Charles H. May, of New York, Dr. C. E. Miller, of Muncie, Dr. T. W. Moore, of Huntingdon, and Dr. Snyder, of Toledo. The addresses touched a very high order of merit, as might, indeed, be expected from the names of their respective authors, namely, Professor Arthur Thomson, Professor Francis Gotch, F.R.S., Dr. Lieven (Aachen), Major R. H. Elliot (Madras), Dr. St. Clair Thomson (London), and Dr. Harold Low (London). There were interesting demonstrations and exhibits by Messrs. H. Herbert, R. Granville Waddy, P. H. Adams, R. J. Coulter, H. G. Armstrong, Bernard Cridland, R. W. Doyne, Sydney Stephenson, and Drs. F. W. Edridge-Green, Wendell Reber, Wiston Baker, Thomson Henderson, T. Harrison Butler, A. G. Gibson, and R. M. Truter.

As usual, the Congress was particularly strong on the social side. The official dinner, presided over by Professor Sir William Osler, Bart., F.R.S., was held in Keble Hall on July 13th, the principal guests being the Vice-Chancellor of the University of Oxford and Dr. Lock, D.D., the Warden of Keble College. There was a garden party at Balliol College, and a smoking concert at Keble College, where most of the members were lodged during the Congress. Organised visits to the more interesting of the Oxford colleges were much appreciated, and so was a visit to the world-famous Clarendon Press. Altogether, a most instructive and interesting programme was carried through.

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Professor Motais.

CONGRATULATIONS to Professor Motais, of Angiers, who has been elected Corresponding Member of the Royal Academy of Medicine of Belgium.

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The Oxford Diploma in Ophthalmology.

The following were the papers set at the recent examination for the Diploma in Ophthalmology of the University of Oxford.—

EXAMINATION FOR THE DIPLOMA IN OPHTHALMOLOGY, OXFORD.

Monday, July 17th, 1911. 10—11.30 A.M.

Dioptrics.

1. State the laws governing the reflection of light, and describe what occurs when (*a*) parallel, (*b*) divergent rays fall upon a concave mirror.

2. How may the size of the retinal image of a given object be calculated? State for what purpose such a calculation may be of practical use.

3. Explain the principles of the Ophthalmometer and Ophthalmometry.

Monday, July 17th, 1911. 11.30 a.m.—1 p.m.

Relation of Ophthalmology to General Medicine.

1. Give a brief account of the symptoms and course of a case of "amaurotic idiocy."

2. Describe the ocular affections met with in locomotor ataxy.

3. Describe the ocular affections which may result from extensive loss of blood.

Monday, July 17th, 1911. 2—5 p.m.

Pathology.

1. Describe the morphological and culture characteristics of Neisser's diplococcus. Which other micro-organisms does it chiefly resemble, and how is it to be distinguished from them?

2. Contrast the microscopical appearances of a section of the conjunctiva from a case of spring catarrh with those of a section from a case of trachoma.

3. Describe the pathological histology of albuminuric retinitis.

4. Describe fully the appearances seen in the specimen under the microscope.

Tuesday, July 18th, 1911. 10 a.m.—1 p.m.

Diagnosis, Etiology, Treatment, &c.

1. Describe the lesions, and their effects upon sight, which may result from a severe blow upon the eyeball *without perforation.*

2. When would you operate in a case of lamellar cataract? What circumstances would influence your choice of operation? Describe the method of operating.

3. Describe the ocular symptoms in paralysis of the cervical sympathetic, and mention how such a condition may be brought about.

4. Describe a typical case of congenital word-blindness.

5. Give the differential diagnosis between tobacco amblyopia and hereditary optic atrophy.

6. What are the causes of pulsating exophthalmos? Describe its signs and symptoms, and the method of treatment you would adopt.

McGill University.

THE medical library of McGill University has been enriched by the gift of rare books on the diseases and surgery of the eye from Dr. Casey A. Wood, of Chicago, as well as by 2,500 reprints on ophthalmological subjects from Dr. Gordon Byers, of Montreal.

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The Middlemore Prize.

THE Middlemore Prize of the British Medical Association, which consists of an illuminated certificate and a cheque value £50, has been awarded on this occasion to Mr. Charles W. G. Bryan for his essay on "Serum and Vaccine Therapy in connection with Diseases of the Eye." The presentation was made in the Great Hall of the University during the annual meeting of the Association held at Birmingham.

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The titles of Communications.

IT is to be wished that authors would read, mark, learn, and inwardly digest the advice given in *Ophthalmic Literature* (June, 1911), edited by Dr. Edward Jackson, of Denver, Colorado. The words are as follow:

TITLES.

"The title of a paper should tell what the paper is about. This is the only service it can render to the reader, although the printer might think of it as improving the appearance of the page, or the writer may contemplate it as something with which it will be creditable to have his name connected. It is to be feared that this last consideration sometimes has weight in determining the selection of a title, when only the first should have any influence whatever. A general, high-sounding title may be preferred to one that definitely indicates just what the paper is about. One may feel distinctly more complacent in seeing himself credited with a paper on the 'Pathology of Conjunctivitis' than if he had chosen the title 'Conjunctivitis from Exposure to Dust.' But the latter would have told just the subject he had written upon, and would have been more serviceable from every other point of view.

"Again, the immodest display of modesty has no proper place in the title of a paper. Many titles begin, 'Some contributions to our knowledge of,' or 'A Study upon,' the particular topic, as though, without some such disclaimer, the reader was likely to suppose that the paper contained everything that had ever been known or written about the subject. Probably 99 out of every 100 papers that are worth reading might be entitled 'A contribution to our knowledge of' their subject. But the part of a title that would be equally applicable to the majority of other papers should not be placed in the title at all. It gives no help to the reader in judging if the paper does or does not bear upon the subject he is studying. The space can be better occupied with something else.

"Another violation of the essential requirements regarding a title is shown by such titles as 'Some Interesting Cases,' or 'A Series of Ophthalmic Operations.' Under such a heading it is common to find discussions of totally unrelated subjects. To publish a scientific paper

under a title that gives no indication of its subject is altogether bad. If a single case or a particular observation is worthy of record it is worthy of an appropriate title. Better a dozen separate communications of a short paragraph each than a more imposing article in which they are combined under a title that gives no idea of their import. In *Ophthalmic Literature* we endeavour to correct this defect by giving a distinct title for each subject dealt with, even though it is something very different from the title that appears at the head of the paper in question. This is done in the interest of the reader, who has a right to claim the help of such guidance. The writer who buries his observations in this manner certainly deserves to have them overlooked and forgotten; and it is a glaring neglect of duty on the part of the editor to permit his journal to appear with imperfect, useless or misleading titles at the head of its original communications."

* * * *

Mr T. B. Archer's retirement.

MR. T. BRITTIN ARCHER has retired from the surgical staff of the Central London Ophthalmic Hospital after forty years' service. On the conclusion of the recent ceremony of laying the foundation stone of the new building in Judd Street, the Earl of Stradbroke, on behalf of the governors and staff of the Hospital, presented Mr. Archer with a gold watch and a silver cup as a token of appreciation of the devoted services he had rendered for so long to the institution.

* * * *

Special classes for short-sighted children.

SINCE the year 1908 the London County Council have had a special class for children affected with high myopia in a blind school at Camberwell. It is now found that additional accommodation is necessary for about one hundred children. The Camberwell experiment is declared to have been so successful that the Council feel that it should be extended. Accordingly, they have agreed to invite the assent of the Board of Education to the principle involved, namely, the institution of special classes for this particular kind of scholar.

* * * *

XVIIth International Congress of Medicine.

THE following are the officers of the section of ophthalmology:—

President: Sir Henry Swanzy.

Vice-Presidents: George A. Berry, W. A. Brailey, Sir Anderson Critchett, Bt., F. R. Cross, Charles Higgens, Edward Nettleship, Priestley Smith.

Council: T. H. Bickerton, Edgar A. Browne, L. Vernon Cargill, E. Clarke, R. W. Doyne, Henry Eales, F. W. Edridge-Green, Freeland Fergus, J. Herbert Fisher, Percy Flemming, Alex. Hill Griffith,

Harold Grimsdale, Gustavus Hartridge, W. H. H. Jessop, H. E. Juler, Wm. Lang, W. G. Laws, Arnold Lawson, W. T. Lister, D. C. Lloyd Owen, J. Herbert Parsons, A. Maitland Ramsay, Arthur Sandford, Cecil Shaw, W. T. Holmes Spicer, J. Elliot Square, Sydney Stephenson, John B. Story, C. H. Usher, Lieut.-Col. M. T. Yarr.

Secretaries: E. Treacher Collins, J. B. Lawford, George Mackay, Louis Werner.

* * * *

Order of St. John of Jerusalem.

CONGRATULATIONS to Mr. D. C. Lloyd Owen, of Birmingham, who has been promoted from Esquire to Knight of Grace of the Order of the Hospital of St. John of Jerusalem.

* * * *

"Ophthalmology."

MR. A. A. BRADBURNE, of Southport, has succeeded Mr. Claude Worth, of London, as English correspondent of our American contemporary, *Ophthalmology*.

* * * *

THE

OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. IX.—No. 10.] *OCTOBER 1, 1911.* [TWO SHILLINGS.

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ORIGINAL COMMUNICATIONS.

PRIMARY MELANOTIC SARCOMA OF THE IRIS.

BY

SYDNEY STEPHENSON,

LONDON, ENGLAND.

ON January 18th, 1911, I was consulted by a gentleman, aged 49 years, on account of some slight discomfort in reading. No other complaint was made, except that the left eye tended to water, especially when exposed to a cold wind.

History.

Fifteen years ago the patient developed left facial paralysis*, believed at the time to be due to a "draught." Under treatment, the condition made a good recovery, although ever since the left eye has watered when exposed.

The late Mr. R. Marcus Gunn was consulted on two occasions, nine and three years ago respectively. On the first visit (November 26th, 1901) Mr. Gunn made some remark concerning the condition of the patient's right eye, but Mr. F——— came away from the interview without any clear notion in his own mind as to what was its precise purport. He is, however, positive

FIG. 1.

that no mention was made of any peculiar marking on the iris. From a transcript of Mr. Gunn's original note (which I have been fortunate enough to see), it is evident that he found in the fundus of the patient's right eye a small, deep, wound-like patch of choroidal atrophy, which he queried as being due to tubercle. Glasses for reading were prescribed upon both occasions when the patient visited Mr. Gunn.

Syphilis denied. No family history of tubercle. The patient is quite unaware that his eye shows any unusual appearance.

*By a singular coincidence, the patient's father had also suffered from Bell's palsy.

On Examination.

R.V. =6/5 (3 letters). T.n. L.V. =6/5 (3 letters). T.n.

R.E.—An oval area of dark chocolate-brown colour (*see* figure 1), measuring in its longest diameter from 1.5 mm. to 2 mm., was seen to occupy the lower and inner part of the sinus of the anterior chamber. It gave one the impression, as it were, of being slightly "humped," but its surface was quite smooth. The neighbouring iris showed no alterations in texture or colour. But it was thought that that portion of the iris did not respond so well to the direct stimulus of light as did the other parts of the membrane. An insignificant patch of slightly enlarged vessels was noted in the ocular conjunctiva near the lower nasal edge of the cornea. Transillumination yielded negative results. Several small aggregations of brownish pigment, believed to be in the nature of moles—*i.e.*, congenital pigmented spots—were present on other parts of the iris (*see* figure 1). On examining the fundus with the ophthalmoscope, an oval, atrophic, and pigmented depression, possibly of tuberculous origin, was found to lie from 2 P.D. to 3 P.D. down and out from the optic disc.

L.E.—Slight eversion of the free edge of the lower eyelid, with consequent displacement of the lower punctum.

A small pigmented mole was present on the right eyebrow.

Diagnosis.

The provisional diagnosis of sarcoma of the iris was made, and the very grave significance of such diagnosis was pointed out to, and discussed with, the patient.

Course.

During the next two months, the tumour appeared to me to become somewhat larger, although it was difficult to be certain of the point.

On *March 21st*, 1911, Mr. Robert W. Doyne, who was seen in consultation, agreed that the tumour was in all likelihood a sarcoma, and suggested that it might possibly originate from the adjacent part of tne ciliary body. He laid stress upon the loss of reaction to light shown by the iris in the neighbourhood of the growth. Enucleation of the affected eyeball was urged upon the patient.

March 22nd, 1911.—Sir John Tweedy, who was called in consultation, was at first rather inclined to counsel delay, but he expressed a wish to see the patient again when the pupil was dilated by a mydriatic. The second consultation was accordingly held on *March 25th*, the pupil being then widely dilated by homatropine and cocaine. The dilated pupil was somewhat flattened opposite the growth, which under these circumstances, appeared somewhat hemispherical, like a segment of a convex lens. One or two fine vessels could be seen with the *loupe* running upwards in the iris from the pigmented growth. Sir John Tweedy concurred in the probable diagnosis of a melanotic sarcoma of the iris, and counselled removal of the eye.

Treatment.

On *March 29th*, 1911, under gas and chloroform, I removed the affected eye.

Pathological Examination.

The excised globe was hardened for several days in formol (10 parts) and normal saline (90 parts), and was then frozen, and divided by a meridianal section passing through the growth upon the iris.

Immediate examination (with the aid of a magnifying glass) showed a small, lenticular, deeply pigmented mass replacing the outer third of the iris on the nasal side of the specimen. It extended from the ciliary attachment to about the middle of the iris.

After embedding in celloidin, and staining with hæmatoxylin and eosin and in other ways, the following appearances were noted when specimens* were examined with the microscope.

FIG. 2.

The root of a portion of the lower nasal quadrant of the iris was replaced by a deeply pigmented swelling of fusiform shape (*see* figure 2). The tumour began at the junction of the iris with the ciliary body, and extended about one-third of the way to the edge of the pupil.

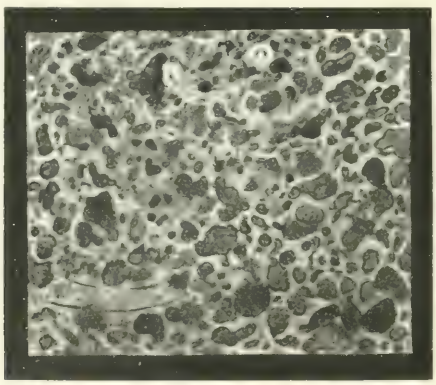


FIG. 3.

Sometimes, not a trace of the normal tissue of the iris could be recognized in the neoplasm, which contained a certain number of blood-vessels. It was composed in the main of large round or oval cells, although some stellate cells could also be recognised (*see* figure 3). All the cells were literally loaded with black pigment, and, indeed, so pigmented was the growth that in many of the

*Shown at the Oxford Ophthalmological Congress on July 13th and 14th, 1911.

sections no details of the structure could be made out. In some of the sections the tumour appeared to be quite sharply defined when examined with a low power ($\frac{2}{3}$ inch), but with a higher power ($\frac{1}{4}$ inch), the division was seen to be less exact. Sections showed that the pigmented cells of the growth had invaded some of the neighbouring ciliary processes, although the ciliary body proper was practically free from them, except in a few of the sections where the anterior portion of the ciliary body was seen to contain a triangular or rounded nodule of growth (*see* figure 4). That the mass of the

FIG. 4.

tumour lay in the iris appeared to show that it had originated from that structure, and had invaded the ciliary processes by contiguity. The growth manifested no evidences of an alveolar arrangement of its component cells.

Tumour cells could be recognised in the meshes of the ligamentum pectinatum iridis, as well as in the lumen of Schlemm's canal, which, by the way, contained blood corpuscles.

The angle of the anterior chamber was widely open on both sides.

The impression conveyed to one's mind was that the tumour had originated from a congenital mole, of which several could be found in the sections. They were represented by aggregations of pigmented cells in the anterior limiting

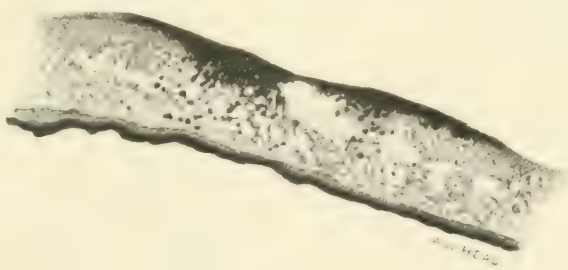


FIG. 5.

layer of the iris, sometimes sending, as it were, pigmented processes into the neighbouring substantia propria (*see* figure 5), but more frequently being sharply differentiated from the latter.

The choroidal lesion noted during life was found to be due to an inflammatory adhesion between a limited part of the choroid and retina.

Pathological Diagnosis.

Primary melanotic sarcoma of the iris, with secondary invasion of some of the neighbouring ciliary processes.

THE ACQUIRED HYPERMETROPIA OF GLAUCOMA.

BY

ARCHIBALD STANLEY PERCIVAL, M.A., M.B., B.C.Camb.

NEWCASTLE-ON-TYNE, ENGLAND.

As far as I can ascertain the cause of this hypermetropia has never been adequately treated. I have, indeed, once or twice heard it stated that it might be explained by the shallowness of the anterior chamber. That this would cause myopia not hypermetropia I now proceed to show.

As the lens is the part that moves forwards, the distance of the retina from the lens must be found in a normal eye, and then this must be compared with the distance in a glaucomatous eye. Let A_0 A_1 A_2 represent the surfaces of the cornea and lens respectively cut by the optic axis, and let H_1 H_2 represent the two principal points of the lens, and H' H'' the two principal points of the total ocular system. The figure is reversed so that the direction left to right is negative. Using Tscherning's most recent data for the normal eye, we have $H'' H_2 = 3{\cdot}973$ mm. and $A_0 H_1 = 5{\cdot}908$ mm.

Radius of curvature of cornea	$r = -\ 7{\cdot}8$ mm.
Refractive index of aqueous and vitreous	$\mu = 1{\cdot}3375$
Posterior focal distance of cornea	$f'' = -\ 30{\cdot}91$ mm.
Anterior focal distance of lens measured to H_1	$\phi = 51{\cdot}34$ mm.
Posterior focal distance of lens measured to H_2	$\phi'' = -\ 51{\cdot}34$ mm.
Posterior focal distance of ocular system	$F''H'' = -\ 20{\cdot}79$ mm.

The distance ($F''H_2$) of the second principal point of the lens from the retina in the normal eye is therefore

$F'' H'' + H'' H_2 = -20{\cdot}79 + 3{\cdot}973 = -16{\cdot}817$ mm. $\therefore$ $H_2 F'' = 16{\cdot}817$ mm.

Now if the lens with its two principal points H_1 H_2 be pushed forwards 1 mm. in glaucoma, $A_0 H_1$ becomes 4·908 mm. and using the well-known system of cardinal points—

$$F'' H'' = \frac{f'' \phi''}{A_0 H_1 + f'' - \phi} = \frac{-30{\cdot}91 \times -51{\cdot}34}{4{\cdot}908 - 30{\cdot}91 - 51{\cdot}34}$$

$$= \frac{1586{\cdot}92}{-77{\cdot}342} = -20{\cdot}518 \text{ mm.}$$

$$\text{and } H'' H_2 = \frac{A_0 H_1 \times \phi''}{A_0 H_1 + f'' - \phi'} = \frac{4{\cdot}908 \times -51{\cdot}34}{-77{\cdot}342} = 3{\cdot}258 \text{ mm.}$$

Therefore now $F''H_2$ or $F''H'' + H''H_2 = -17{\cdot}26$, or $H_2 F'' = 17{\cdot}26$ mm.

But in this case H_2 is displaced 1 mm. in front of its previous position, so F'' is 16·26 mm. behind the previous position of H_2, whereas the retina is 16·817 mm. behind H_2 as we found above, or F'' is ·557 mm. in front of the

retina. Hence a myopia is caused by advancing the lens 1 mm. and reducing the depth of the anterior chamber by this amount —

[Indeed, as in the above case, F′ is found to be 15·34 mm.

$$\text{and as } D = -\frac{1000\,l}{F'\ F''} = \frac{557}{(15{\cdot}34) \times (-20{\cdot}518)} = -1{\cdot}76$$

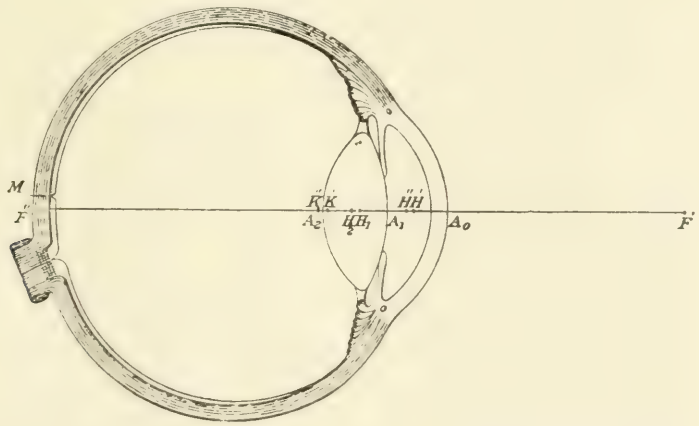
about −1·75 D. of myopia would be caused.]

As a matter of fact we observe a hypermetropia induced in glaucoma in spite of the shallow anterior chamber. There are only two compensatory changes conceivable in glaucoma :—

(1) Increase of the refractive index of the aqueous and vitreous.

(2) Diminution of the curvature of the cornea.

The first seems improbable, and the second change I have actually observed in two cases of chronic glaucoma. On measuring the curvature of the cornea I have found that in one case the radius was increased about ·5 mm. between two successive visits.



It is indeed just what one would expect. With the increased tension the globe of the eye will tend to become more spherical, so as to adapt itself to the increased contents ; in other words, the corneal curvature will tend to be reduced. I am afraid that this is hardly in exact accord with Henderson's statements.

It is easy to find what curvature of the cornea is required to annul the myopia occasioned by a diminution of 1 mm. in the depth of the anterior chamber. We have to find for what value of f'', F'' will fall on the retina. In a normal eye $F''H_2 = -16{\cdot}817$ mm. ; when H_2 is pushed 1 mm. forwards, $F''H_2 = -17{\cdot}817$ mm.

We have $F''H_2 = F''H'' + H''H_2 = \dfrac{\phi''(f'' + A_0H_1)}{A_0H_1 + f'' - \phi'}$

$$\therefore \frac{1}{F''H_2} = \frac{A_0H_1 + f'' + \phi''}{\phi''(f'' + A_0H_1)} = \frac{1}{\phi''} + \frac{1}{f'' + A_0H_1}$$

$$\text{or } \frac{1}{f'' + 4{\cdot}908} = \frac{1}{-17{\cdot}817} - \frac{1}{-51{\cdot}34} = \frac{1}{-27{\cdot}286}$$

$$\therefore f'' = -27{\cdot}286 - 4{\cdot}908 = -32{\cdot}194 \text{ mm.}$$

But $f'' = \dfrac{\mu r}{\mu - 1}$

$$\therefore r = \frac{(\mu - 1)f''}{\mu} = \frac{\cdot 3375\,(-32{\cdot}194)}{1{\cdot}3375} = -8{\cdot}1237 \text{ mm.}$$

Any increase in r beyond this length will cause hypermetropia, although the anterior chamber is 1 mm. shallower. In order that no myopia may occur, the curvature of the cornea must be lessened, or its radius increased from 7·8 mm. to 8·1237 mm ; *i.e.*, the increase must be ·3237 mm.

THE HISTO-PATHOLOGY OF DIPLO-BACILLARY CONJUNCTIVITIS, BASED UPON THE EXAMINATION OF TWENTY CASES.

BY

HANFORD MCKEE, B.A., M.D.

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(FROM THE PATHOLOGICAL LABORATORY OF THE MONTREAL GENERAL HOSPITAL.)

THE first description of the tissue changes in diplo-bacillary conjunctivitis was given us by Stock, who found hypertrophy of the epithelium in the region of the lid margins, and macerated skin, with development of glandular ingrowths. He found in the conjunctiva a wide-spread infiltration of the mucosa with enormous numbers of goblet cells. Mayou stated that in this condition it was only the less resistant plasma cells which were multiplied in the subepithelial tissues. Pusey confirmed Stock's report, and went further by finding the diplo-bacilli in the tissues. In June last Miyashita published an account of his examination.

From time to time during the last few years I have examined tissue obtained from suitable cases. The tissue was taken from the palpebral conjunctiva of adult patients who had a marked conjunctivits, and where diplo-bacilli were present in large numbers. The study of excised pieces of tissue is of limited value, but in many cases of this disease, the palpebral conjunctiva alone shows signs of inflammation, so that a study of a series of pieces of tissue from the tarsal conjunctiva may be of as much value as the study of one whole eye.

The tissue was all fixed in Zenker's solution, and hardened in alcohol. Extra pieces of tissue were fixed by different methods. All the tissue was embedded in paraffin, and stained with eosin-methylene blue. A description of each piece of tissue would involve needless repetition, so that I shall describe six of the cases, which together bring out the different points I wish to emphasize :

(1) The whole histological picture is that of a chronic inflammation upon which an acute one has been superimposed. The epithelial layer is everywhere infiltrated with polymorphonuclear leucocytes. The subepithelial tissue shows a profuse infiltration with lymphoid and plasma cells, which are denser immediately about the blood vessels. The plasma cell type predominates. There are also a few scattered eosinophiles of the mononuclear type. The capillaries are dilated and show great numbers of polymorphonuclear leucocytes. These can be traced in a broken line from the vessels to the epithelium. At one part of the section, the epithelium is diverticulated, forming a well-defined pouch, which is completely covered over with detached epithelium, nuclear fragments, red blood cells, fibrin, and detritus. There is some evidence of organisation of this mass in the invading fibroblasts, which apparently come from the subepithelial layer, where there are numerous masses of young connective tissue cells.

(2) The striking feature in this specimen is the multiple cyst formation in

the epithelial layer. These cysts vary in size, and for the most part are filled with serum and polymorphonuclear leucocytes. Some of them show direct communication with the surface through small openings. The cyst wall consists of flattened-out epithelium. They are presumably the result of mucoid accumulation, which has not been discharged and subsequently invaded by polymorphonuclear leucocytes, and are rather unique as this is the only case in which they were seen in this series. The subepithelial tissue is diffusely infiltrated with lymphoid and plasma cells, the latter predominating, while eosinophiles are not infrequent here. There is an entire absence of polymorphonuclear leucocyte infiltration in the sub-epithelial tissue.

(3) The cells of the epithelial layer are for the most part ballooned or swollen with œdema. This condition is seen only in a moderate number of the epithelial cells, but is the characteristic feature of the section. The subepithelial layer contains aggregations of lymphoid and plasma cells which lack the characteristic appearance of the trachoma follicle. One of them is about a Meibomian duct. Many of the lymphatics are engorged with lymphoid cells. There are a few eosinophiles, but polymorphonuclear infiltration is absent.

(4) The striking feature here is the close proximity of the lesion to the epithelial layer. There is a dense lymphoid and plasma cell infiltration confined to the connective tissue just beneath the epithelium. The cells are largely of the type seen in trachoma—large light staining cells with vesicular nuclei. A second striking feature is the great distension of the underlying lymphatics with lymph cells. There are numerous mononuclear eosinophiles throughout the section. Polymorphonuclear infiltration is practically absent.

(5) The epithelial cells contain large spherical or ovoid masses of what look like mucus. Many of them have the appearance of goblet cells. The epithelium is everywhere invaded with polymorphonuclear leucocytes. At one part of the section the subepithelial tissue is densely infiltrated with lymphoid and plasma cells. Immediately between this area and the underlying epithelium there are a large number of young connective tissue cells, in places invading the epithelium, which at this point is thrown into furrows. The subepithelial tissue is thickly beset with eosinophiles.

(6) Many of the cells in the epithelial layer represent the so-called goblet cells because of their mucous contents. The epithelium in places shows rather a marked polymorphonuclear infiltration. This is seen only in a moderate number of the epithelial cells, but is a characteristic feature of the section. The absence of polymorphonuclear leucocytes in the subepithelial tissue suggests that they are from the conjunctival sac. A mild grade of chronic inflammation is seen in the subepithelial tissue. The vessels are dilated and injected, and the perivascular tissue is œdematous. In one part of the section there is a beginning new growth of connective tissue, just beneath the epithelium. The conjunctiva is thickened because of this increase in the connective tissue of the subepithelial layer. This connective tissue, like any connective or scar tissue, sooner or later contracts, but does not do so equally. This contraction pulls down the epithelial covering at various points, and explains the fold-like appearance of the epithelial layer. The folded-in appearance naturally has the appearance of a tube, but it is not actually a tubule. All end blindly, and in no sense are they connected with secreting glands. The true appearance of the tarsal conjunctiva in this form of inflammation is a nodular one. The essential lesion here is in the subepithelial layer, and consists of a mild chronic inflammatory process, as shown by the increased connective tissue, the infiltration with lymphoid and plasma cells, and the large number of eosinophiles. Occasionally, a section goes through the duct of a Meibomian

gland, but this is a normal occurrence, and shows no contraction of the connective tissue.

The Diplo-bacilli in the Tissue.

Stock did not find bacteria in the tissue which he examined, but expressed the opinion that the diplo-bacilli were probably restricted to the surface of the epithelium.

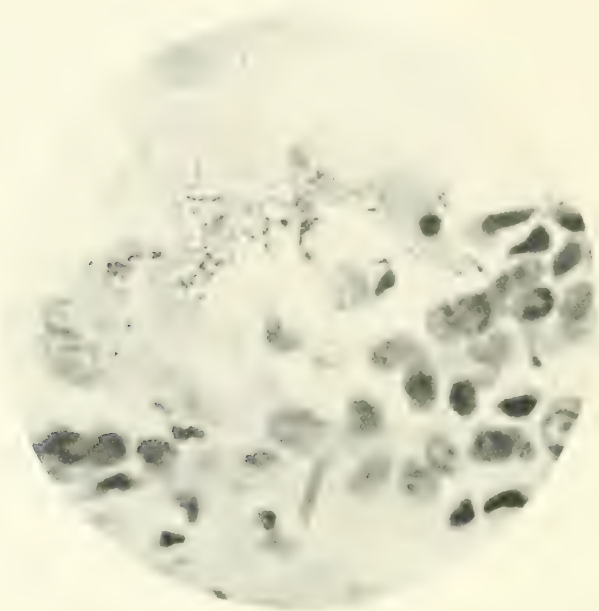

Fig. 1. A microphotograph of 1,500 diameters showing diplo-bacilli on the surface of the epithelium.

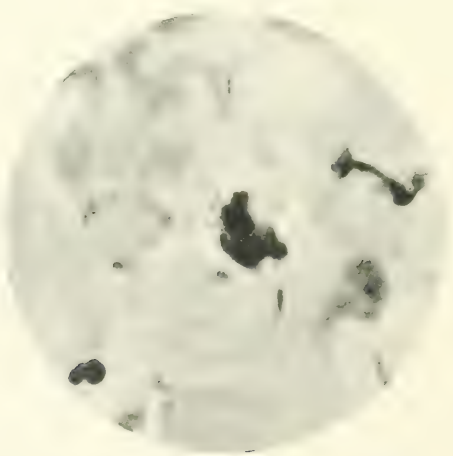

Fig. 2. A microphotograph of 1,500 diameters showing a diplo-bacillus in the subepithelial tissue.

Morax and Petit found numerous diplo-bacilli in the infiltrated margin of an ulcerated leucoma adherens. They stained best with Nicolle's carbol-thionin.

The following is from Pusey's article : " Between the superficial cells of the epithelial cell layer occasionally one finds diplo-bacilli. The organisms within the epithelial cell layer are rare and apparently do not penetrate deeply, for in a search through many sections, I did not find them below the second layer of cells. In the sub-epithelial tissue I did not find bacteria."

Miyashita was not able to demonstrate the diplo-bacilli in the tissue.

In the first six cases examined I treated a series of slides with Wright's stain. The demonstration of the diplo-bacilli was easy. They were found on the surface of the epithelial cells in large numbers, and between the epithelial cells were seen in smaller numbers (Figure 1). The diplo-bacilli were further found in the sub-epithelial tissue. They were not intra-cellular, but were lying free in the tissue. They were seen even in the deepest part of the sub-epithelial tissue (Figure 2). The finding is important, in that it may help to explain the chronicity of this form of conjunctival infection.

Conclusions.

1. The epithelium is frequently infiltrated with polymorphonuclear leucocytes.

2. We may have an œdematous condition of the epithelium with the presence of goblet cells, and cystic formations, the result of mucoid accumulation.

3. The conjunctiva is thickened because of the increase in the connective tissue of the subepithelial tissue, where we find young connective tissue cells, dilated capillaries, eosinophiles, and a disseminated infiltration with lymphoid and plasma cells, the latter predominating.

4. The true appearance of the conjunctiva is a nodular one. This is borne out by clinical evidence.

5. Diplo-bacilli are found on the surface of the epithelium, between the epithelial cells, and deep in the subepithelial tissue.

6. The essential lesion is in the subepithelial layer, which shows a chronic inflammatory process upon which an acute one is often superimposed.

I am indebted to Dr. C. W. Duval for assistance, and to Dr. S. B. Wolbach for the microphotographs.

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THE DISCRIMINATION OF COLOUR.*

BY

F. W. EDRIDGE-GREEN, M.D., F.R.C.S.

BETT MEDICAL RESEARCH FELLOW.

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IN a paper on the relation of light perception to colour perception†, and in previous writings,‡ I have stated that if a portion of the spectrum be isolated, it will appear monochromatic, the length of the monochromatic region

* A Communication made to the Royal Society.

† *Roy. Soc. Proc.*, B, 1910, Vol. LXXXII, p. 458.

‡ *Colour Blindness and Colour Perception*, International Scientific Series.

varying with the intensity and wave-length of the light and colour perception of the observer. Most normal sighted persons make about eighteen such divisions in a bright spectrum.

In a paper in the *Proceedings of the Royal Society** Lord Rayleigh, whilst agreeing that the facts were as I stated in the conditions described by me, expressed the opinion that he could distinguish between the wave-lengths included in a monochromatic division to the extent of discriminating between the colours of the two D lines. Lord Rayleigh kindly lent me the colour box with which he had made the experiments, and, on repeating them in the manner described by him, I arrived at similar results. I hope, however, to be able to show that the results obtained by Lord Rayleigh were due to the admixture of small quantities of white and coloured light and to certain physiological influences which had not been taken into consideration, and which prevented him from arriving at a correct interpretation of the colours.

If a prism, even of the finest polish, be examined with a strong light against a dark background, numerous small particles and irregularities of the surface, which irregularly disperse the light, will be seen. The reflections from the sides of the prisms, lenses, and sides of the box have also to be taken into consideration. The amount of this irregularly dispersed light is small, but is a very important factor taken in conjunction with other facts. It is necessary, therefore, in order to get rid of the greater part of this irregularly dispersed light, to allow the light included in a monochromatic region to pass through a second aperture, such as that in my spectrometer. When this is done, I have found it impossible by any method which I have adopted to distinguish between the various waves included in the monochromatic region. I have magnified the image of this region with eyepieces of different power, making a corresponding increase in the light to make up for the loss of luminosity caused by the magnification. I have also obstructed the central portion of the monochromatic region with a screen, and the remaining portions have still appeared monochromatic. The most conclusive experiment, however, is the examination of the monochromatic region with an achromatic double image prism, the intensity of the source of light being increased as before. By this method two rectangular monochromatic fields are seen, and can be arranged so that they are side by side and just touch. The portion belonging to the red side of the spectrum of one can be made to touch the portion belonging to the violet side of the spectrum of the other. This position is therefore most favourable for the detection of any difference, and yet I cannot detect any, neither can any other observer to whom I have shown the experiment. The experiment can be observed objectively in the following manner.—An arc light being used for the illuminating source, a pure spectrum is obtained; a portion of this spectrum, forming a monochromatic region, is allowed to pass through an adjustable slit. Two images of this monochromatic region can be thrown with the aid of a double image prism upon a screen and made of any required size. The varying size of the monochromatic regions with different persons can by this means be demonstrated to a large number.

Another point which I found with Lord Rayleigh's apparatus is the difficulty of obtaining both fields of similar intensity. The slightest movement of the eye also causes an alteration in the number and kind of rays which enter the eye. When two fields are of unequal intensity the physiological effect of contrast is evoked, which causes an erroneous judgment of the colours under observation. In fact, weak orange light may, by contrast with

* December, 1910.

bright red light, appear green. In making experiments on the discrimination of colour, the rays of light from the two regions to be compared should strike the eye at as nearly as possible the same angle ; the fixation point of the eye should be in the centre between the two regions, so that one region may not be more influenced by the pigment of the yellow spot, or the blood in the retina, than the other, and that equal amounts of light from each region enter the eye.

The importance of the irregularly dispersed light in association with contrast in dealing with questions of colour has been overlooked by many physicists, as several instruments have been constructed for the investigation of colour and colour vision, which are defective on this ground. It was this irregularly dispersed light, as shown by Helmholtz,* which caused the apparent change in the colours of the spectrum observed by Brewster, and which led him to suppose erroneously that there were three kinds of solar light.

In conclusion, when special means are taken to have as pure a spectrum as possible, I can find no method which will enable me to distinguish the colours in a monochromatic region. I therefore regard the appearance of the monochromatic region as a fundamental physiological fact, as I stated over twenty years ago.

CLINICAL MEMORANDA.

NOTE ON FAMILY DEGENERATION OF THE CORNEA.

BY

LESLIE BUCHANAN, M.D.

SURGEON TO THE GLASGOW EYE INFIRMARY.

IN THE OPHTHALMOSCOPE, Vol. V, page 698 *et seq.*, two cases of family degeneration were recorded, and, in a note regarding the family history, it was stated that "a sister who resides in England has had defective vision for several years." As I have recently seen this sister and have found the condition of her eyes to be in all respects comparable with that of the eyes of A. M. and W. M., it may be of interest to report what can be said of the family now (August, 1911).

Since 1907, I have had an opportunity of seeing both brothers once (in 1908) and at that time both were able to pursue their former types of occupation.

A. M. died of consumption a year later (1909) and it is said by his relatives that he contracted the disease from his wife, who died of consumption about 18 months earlier. W. M. was seen at the Eye Infirmary in August, 1910, and was then finding it increasingly difficult to do his work as an engine fireman, on account of being unable to read the pressure and water gauges. The use of eserine and dionine helped to soothe the eyes, which were slightly irritable, and he returned to work. In August, 1911, he again presented himself, as he was unable to work, and I have taken him into the Hospital in order to try the effect of rest and other forms of treatment.

So far as can be seen, the eyes are very little changed. The central area seems to have remained as it was, but there is undoubtedly slightly more opacity of the, formerly clear, peripheral zone. The opacity now present in

* Poggendorff's *Annalen*, 1852, No. 8.

the periphery of the cornea is very fine in texture, more a haze than actual dots, until the cornea is magnified, when it is seen that the structure is filled with very small spots of opacity. The vision is now reduced to "fingers at two feet" with each eye.

The main interest of this note is the condition of the sister.

M. M., aged 36, is working in a paper factory, and has been able to become forewoman.

Her sight remained "good" until eight years or so ago (possibly more), when she noticed some difficulty in doing her work. She had, at that time, to sort papers by colour and texture, and she thinks that she can still do this, although it is difficult.

She, like her brothers, is a thin, wiry-looking individual, whose expression is that of chronic anxiety.

The conjunctivæ are slightly congested. The corneæ are practically precisely alike. The central area is distinctly hazy for a radius of about 2 mm., and round this there is a ring of dotted opacity of 1·5 mm., and round this again a clear, almost absolutely clear, ring to the periphery. The central area is found to be occupied by very small bluish-grey dots when magnified by the corneal microscope.

The dotted zone is made up of fine spots and large spots of irregular shape, probably the result of union of numbers of small dots. The vision amounts to $\frac{4}{36}$ each eye.

The tension of both eyes is normal. The pupils are equal and active. The general health is said to be very good. She is "never off work a day." My only advice to her was that she should leave matters alone in the meantime.

INTRA-OCULAR INFECTION BY THE KLEBS-LÖFFLER BACILLUS.

BY

PHILIP A. HARRY, M.D., D.P.H.,

LATE OF THE GENERAL INFIRMARY, LEEDS.

THE importance of the following case, as well as the dangers associated with it, warrant a detailed description:

Mrs. C., aged 70, of Doncaster, was admitted for the second time on February 14th, 1911, under the care of Mr. G. Constable Hayes. She had a mature senile cataract in the left eye.

The right eye, except for incipient lens changes, was perfectly normal. The left lens seemed in every way suitable for extraction.

She had been admitted previously (December, 1910) for the same operation, but it was found that she had two cysts of Moll's glands on the nasal side of the left lower lid; one moderately large, and one small. They were removed under general anæsthesia. During the three or four days that the eye remained bandaged, no excessive discharge of muco-pus was noticed, although the palpebral conjunctiva was more injected than normal, so much so, that it was decided to postpone the operation of extraction of the lens to a later date.

Previous to this, only a vague history of prolonged nasal discharge, in July and August, 1910, could be elicited, and a still less definite history of sore throat. There was no suggestion of any illness like diphtheria.

The left lens was extracted under cocaine on the 16th of February. Except for some slight injection of the conjunctiva of the lid, the external

appearances of the eye were normal. All the usual precautions were taken, the surrounding parts were washed, the conjunctival sac was douched with boric lotion, the patient's head being enveloped in a sterilized towel and her nose and mouth covered with sterile gauze, the surgeon wore cap and mask.

The operation was performed without a hitch, the lens coming away almost entire. The patient complained of no discomfort in the eye for the rest of the day or during the night although her rest was broken by a disturbance created by the patient in the adjoining bed. At the first dressing on the following morning, Mr. Hayes was astonished to find a muco-purulent discharge soaking the pad and welling out from between the lids, which were red, but not markedly swollen or œdematous; the bulbar conjunctiva was injected; the wound was not healed.

Half-hourly fomentations and hourly douchings were immediately commenced, combined with the frequent instillation of 1 per cent. atropin sulphate drops and iodoform ointment once daily. After four or five days of this treatment, the discharge became considerably less. The lips of the wound, however, remained swollen and unhealthy looking. Infiltration extended in the cornea from the wound towards the centre in a V-shaped manner. Hypopyon was never noticed. Yellowish exudate of lymph from the wound and from the iris filled the coloboma and the upper part of the pupil.

The hope was entertained even up to this time that the eye would be saved, as perception of light still remained, and there was no sign of vitreous infection or panophthalmitis; indeed, the intraocular infection was localised to the immediate vicinity of the wound.

The treatment was persevered with during the next fortnight, only with diminished frequency.

About the end of the first week in March, the patient began to complain of supra-orbital pain, the eyeball was painful to touch, and perception of light disappeared, symptoms that pointed to ciliary and choroidal infection. The upper part of the cornea appeared to be sloughing. On the 10th of March, three weeks after the first operation, evisceration was performed on the left eye with the patient's consent. The cornea was removed with a pair of scissors, cutting well beyond the corneo-scleral junction. The shrunken, organized vitreous came away with the cornea attached to its surface by a narrow pedicle. A quantity of clear, yellow serum escaped from the eye. The choroid and retina were scraped out, the interior of the sclerotic was douched, and the conjunctiva was stitched over it.

Portions of the cornea and vitreous, as well as some secretion from both conjunctival sacs, were sent to the clinical pathologist, Miss Eglinton, who reported as follows :—

"The culture from the cornea gives a growth of diphtheroid bacilli.

"That from the vitreous is sterile after twenty hours' growth.

"The culture on serum of the pus from the right conjunctival sac gives a growth of a large number of Hoffmann's, with a few Klebs-Löffler bacilli.

"That from the left conjunctiva gives a single colony of a diphtheroid bacillus."

It may be remarked that this swab was taken from the conjunctiva after douching.

Three days after the evisceration, secretion from the undouched left conjunctival sac gave a pure culture of most typical Klebs-Löffler bacilli. Swabs from the nose and throat yielded only staphylococci and streptococci, with no bacilli.

The interesting features in connection with the case are :—

(1) The absence of marked conjunctivitis before the first operation.

(2) The rapid increase of virulence after the eyes were padded.

(3) The absence of infection of the vitreous, which, as a rule, affords such excellent pabulum for invading organisms.

(4) The total absence of systemic disturbance, and the limitation of the intraocular infection to the vicinity of the wound.

(5) The persistence of the conjunctivitis and the character of the secretion, which was never membranous.

A CASE OF TUBERCULOUS CHOROIDITIS.

BY

W. DUNCAN LAWRIE, M.D., F.R.C.S.E.

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Emily A., age 23 years. A weaver.

Family History.—Father died of cancer a few months ago. Some of his relatives were tuberculous. Two of the patient's sisters have died of tuberculous meningitis.

Present Illness.—For some months, the patient has been complaining of a cough, headaches, constipation, loss of energy, and feeling of illness. She is usually a bright girl, but lately has been dull. She came to consult me on account of the headaches, thinking perhaps her glasses required changing. The left eye diverges occasionally.

Under Homatropine :—

R.V. $= \frac{6}{18} + 3$ D. sph. $\bigcirc -$ 2·50 D. cyl. ax. horiz. $= \frac{6}{6}$.

L.V. $= \frac{6}{24} + 3$ D. sph. $\bigcirc - 4$ D. cyl. ax. horiz. $= \frac{6}{6}$.

The left fundus shows in the macular region a patch of choroidal atrophy arranged as follows.—There are two circular pigmented patches of complete atrophy coalescing along one of their margins. On the temporal side of these two patches and continuous with them, the chorio-capillaris and pigment layers are atrophied over a small area, allowing the larger choroidal vessels to be seen with some irregular heaping up of pigment over them, and forming a gradual transition to normal fundus.

Above this conglomerate patch are seen two minute round nodules, yellow in colour, acuminate in outline, apparently projecting above the general retinal level.

Examination of chest shows right apical phthisis—*viz.*, defective expansion impaired percussion note, bronchial breathing, and crepitations.

Treatment.—Mist : Sod. Nuc. Vom. c. Gent. with hygienic measures, was ordered, and injections of new Tuberculin T.R. were instituted, begining with 1/5000 mg. The first injection was followed by a slight reaction, and the patient had to stay in bed one day. The injections were continued weekly on Saturdays, and the patient went on with her work until six or seven had been given, when she had a month on the hills. Twelve injections were given according to the tables published by Messrs. Allen & Hanburys, Ltd., following that recommended in chronic phthisis ; two doses of each strength were given and the dose was increased up to 1/1000 mg. The result of treatment was an increase in weight of 5 lbs. The patient felt perfectly well and had lost her cough. The two recent nodules in the choroid have disappeared. Only an occasional crepitation is audible in the chest over a very small area. The patient is bright, hearty, and is doing a good week's work as a weaver.

Note.—The fundus condition—thanks to the light we now have as to its ætiology—was instrumental in drawing attention to the early pulmonary tuberculosis, and thereby allowing efficient treatment to be carried out.

I should like to draw attention to the family history, which illustrates the relationship between cancer and tubercle—in my experience, a frequent occurrence.

NOVELTIES.

NEW OPHTHALMIC CALIPERS.

BY

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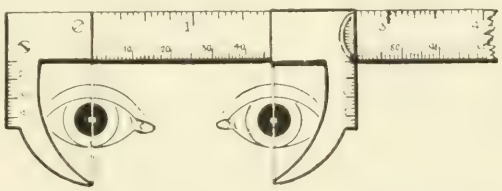
LONDON, ENGLAND.

WITH the increasing necessity for the correct centering of spectacles, there comes the demand for a rapid and accurate measurement of the ocular base line. It is no longer found sufficient, as in former days, to take a rough measurement of the interpupillary distance. The instrument shown in the figure was devised for the purpose of measuring the base line in working with the registering form of diaphragm test, and the new calipers have proved, after a year's work with that instrument, to give this measurement with the greatest expedition, and with an accuracy that meets the stringent conditions of that test for binocular vision.



In experimental forms the calipers were exhibited to the Ophthalmological Society in 1909 and 1910; they are now made in excellent fashion by Messrs. George Culver, Ltd. The raw material used is steel, and the workmanship is excellent.

Briefly, the method of usage is as follows.—The patient faces a distant light, either a window or lamp, and looks at it with both eyes; the images of the light are seen upon the corneæ and mark the visual axes. The surgeon faces the patient at arm's length, places the rule upon the patient's brows, and sights the fixed wire over the image on the patient's right eye. Then the other wire is slid over the image on the left cornea and carefully sighted. The surgeon sights the patient's right eye with his own left eye and *vice versa*. In measuring the base line for near vision, the procedure is the same, but the light is put over the surgeon's head at the requisite distance and the patient looks at it.

The vertical scales on the jaws are for the purpose of measuring the vertical displacement of lenses for the correction of hyperphoria. The trial lenses are tilted until the defect as measured with the scale test card in the diaphragm test is corrected; the rule is held horizontally across the patient's brows, and the depression of the lens of one side, as compared with the other, read off.

REVIEW.

THE FIELD OF VISION.

BY

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PART I.

METHODS.

WITHIN recent years several modifications of the ordinary methods of taking the visual field have been introduced with the idea of getting a more complete and exact knowledge of the functional activity of the retina, optic nerve tracts, and visual centres. These modifications, in the main, consist in alterations in the illumination and size of the test object, variations in the distance between the patient and the screen, and various devices calculated to ensure more accurate fixation of the test object during the perimetric examination.

I. Bjerrum's Method[1] and its Modifications.

In its original or modified form this method has influenced ophthalmic practice to a considerable extent. By this method small scotomata are projected on a large scale, which facilitates their discovery and definition, and it brings out slight alterations in the field in the early stages of glaucoma, which are of decided diagnostic and prognostic importance. The test objects generally employed in field taking on an ordinary perimeter are 1—2 cms. in diameter and subtend an angle of 2° to 4° at 30 cm.

The maximum extent of the visional field is obtained only when the test object is viewed under a visual angle of ½° or more, and when the object viewed is reduced below this size, the extent of the field of vision becomes restricted accordingly.

In Bjerrum's method the test objects are very much smaller than the size required to give the full field—which should first be taken on an ordinary perimeter in the usual way. The defects found with the latter method are said to be absolute, while those found with Bjerrum's small test objects are regarded as "relative," because when a larger object is used over the same area, vision can be excited.

To apply the Bjerrum test, a large black screen, 2 metres or more in width, is suspended vertically, in a good light, at a distance of two metres from the patient. The test objects are small discs of white ivory, or stiff unglazed white paper, from 20 mm. to 1 mm. in diameter, carried on a long, dull, slender black rod, with a spring catch at the end of it. The fixation spot consists of white or grey paper which is of variable size, the smallest which the patient can comfortably see being chosen. As a rule, the fixation spot is placed in the middle of the screen, which admits of testing to about 27° from the point of fixation, but when a large test object is used and the extent of the field exceeds that of the screen, the fixation object may be placed on the margin of the screen. The surface of the screen is marked out, with fine black cord or thread, in radiating lines at intervals of 15° and circles at intervals of 50 mm. These enable the examiner to transfer the tracings on to a perimetric chart by reference to a logarithmic

table. Sinclair[2] has this table on a lath-shaped rule which can be held against the surface of the screen along the radii, with its end carefully adjusted to the centre. In this way the position of any one of the black pins used to mark out the field upon the screen can at once be indicated in degrees. This method does away with the necessity of having so many concentric lines, and prevents the introduction of error from shrinkage or wrinkling of the screen. The surface of the screen could be kept free from all threads by placing the tangent scale on the back of the screen or on a separate canvas sheet backing the screen.

The average normal field taken by this method and projected on an ordinary perimeter chart is much smaller than that obtained with a 10 mm. test object at 30 cm. distance. Sinclair[2] gives the following average dimensions of the field for white when test objects of 6 mm., 3 mm., and 1 mm. are employed at a distance of 2 metres from the patient :—

	Out.	In.	Down.	Up.
$\frac{6}{2000}$ - - - - -	50°	40°	40°	35°
$\frac{3}{2000}$ - - - - -	37°	30°	30°	25°
$\frac{1}{2000}$ - - - - -	26°	26°	25°	24°

The blind spot measures 7 inches in diameter, and is surrounded by an amblyopic zone, having irregular and less defined extensions generally at the upper and lower poles, corresponding to the position of the large blood vessels as they leave the disc.

If the field is taken in reduced light, no changes are noticeable in the extent of the normal field, but pathological defects tend to be accentuated.

Modifications of Bjerrum's method.

The inconveniences of the application of the large screen test and the difficulty often experienced in finding sufficient and suitable space for the screen in ordinary consulting rooms, have led to the adoption of certain modifications of the original method. These methods aim at making the screen portable, so that it can be brought into a suitable light and into a position convenient for the patient ; and also the transference of the field on to an ordinary perimeter chart is simplified by having scales indicating the position of the test object fixed to the back of the screen. The two modifications in general use are :

Priestley Smith's Scotometer and Bardsley's Scotometer.

(*a*) *Priestley Smith's Scotometer*[3] (Fig. 1) consists of a millboard disc, 39 cm. in diameter, covered on the front with dull black cloth, and marked on the back with degrees of the circle (0°—360°). The 5°, 10°, 20°, 25° circles are indicated on the cloth surface by small black knots, which are not noticeable to the patient, but can easily be felt by the surgeon. The fixation point is formed by the screw, which fixes the disc to the vertical stand, and on which the disc is rotated when the test is applied. The distance of the patient from disc (35 cm.) is fixed by a couple of wires converging from supports on each side of the disc to a knobbed handle which is suspended from the wires, and is held against the cheek when the test is applied. The height of the disc can be altered to suit each patient. The field is investigated by sticking a 2 mm. piece of thread or blotting paper on one of the knots, indicating the degrees from the centre, and starting with pointer at the zero of the circle scale. The disc is moved slowly round in the direction of the natural sequence of the numbers on the scale, while the patient carefully fixes the centre screw. The process is repeated with the test object applied to the other knots on the screen, and even on some intermediate points, if thought desirable.

If the test object does not disappear or get dim in the 25° circle, glaucoma may be excluded with a fair degree of certainty, as it shows that there is no defect extending from the blind spot towards the periphery. But as the initial defect in glaucoma sometimes extends from the blind spot towards the fixation point and not towards the periphery, it is necessary to explore the 10°

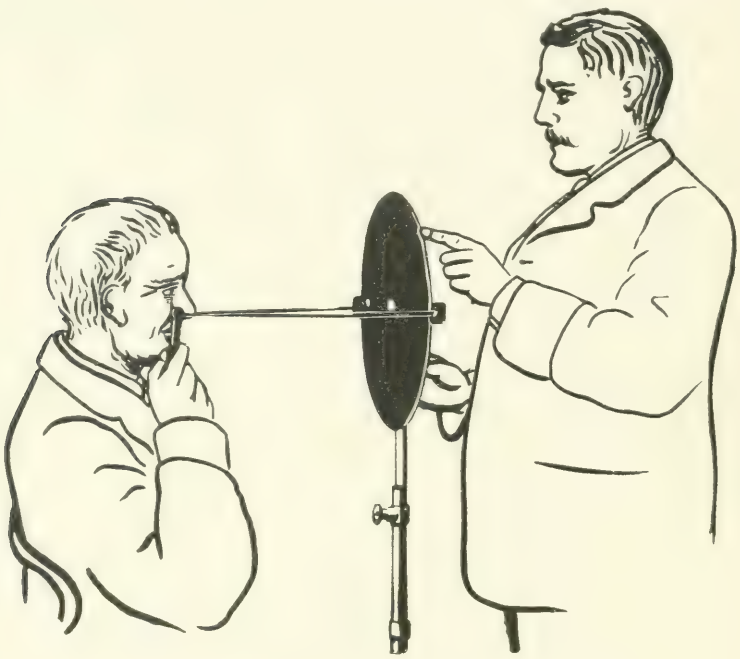

FIG. 1.—Priestley Smith's Scotometer.

circle, as well as the 25° circle, in order to exclude Bjerrum's sign. If there be no defect in either circle there is no glaucoma. The results of the examination may be plotted out on an ordinary perimeter chart or recorded as follows :—

Scotometer : 2 mm. white 5° circle — no defect.
10° circle — defect 10° to 50°.
25° circle — defect 10° to 20° and 240° to 0°.

Priestley Smith[4] has also modified his ordinary perimeter, so that it may be conveniently used as a scotometer.

(*b*) *Bardsley's Scotometer*[6] (Figs. 2 and 3) is also applicable for the detailed investigation of the central field, *i.e.*, within 30° of the point of fixation. The "screen" is a dull blacked section of a hollow sphere with a central fixation-disc which is perforated, so that the surgeon can watch the eye of the patient and thus detect any deviation of the eye from the point of fixation.* A fine slot, in which slides the carrier for test objects of various sizes and colour, extends from the fixation disc to the edge of the screen. On the back of this slot is a scale indicating degrees from the centre, and on the edge of the posterior surface of the screen is a scale of circumferential degrees. The screen can be rotated round the fixation disc, and when a scotoma is

* Perforation too small to be of much service in practice.—EDITOR.

found, its circumferential dimensions can be measured by the rotatory movement and its radial dimensions by the movement of the disc along the slot. It has the advantage over Priestley Smith's scotometer that the exact shape

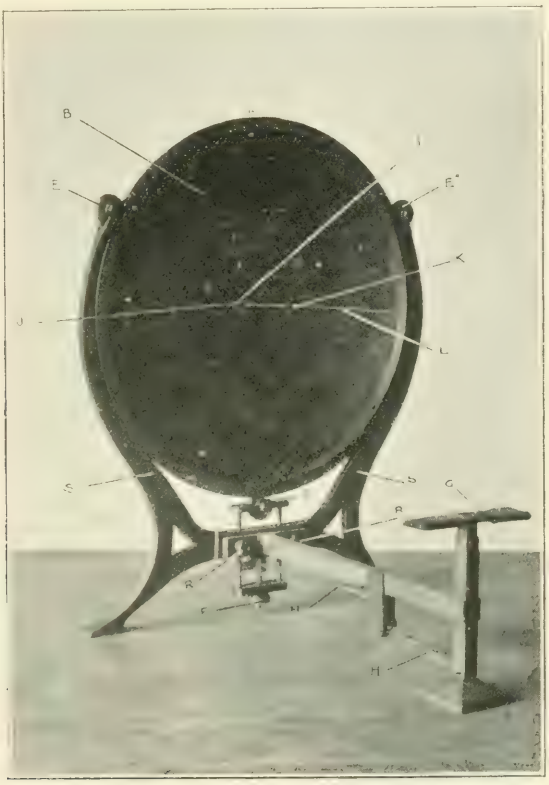

FIG. 2.—Bardsley's Scotometer.

A. The section of a hollow sphere.
B. Dull-blacked concave surface of same.
C. Posterior convex surface of same.
E. E^1. E^2. Small wheels on which spherical section rotates.
F. Milled nut for raising or lowering E.
G. Chin rest, raised by—
H. Rod and pivoted cranked bracket.
I. Fixation disc, 6 mm. in size.
J. Small central hole for surgeon to look through.
K. Disc of variable size and colour sliding in.
L. Very fine slot.
M. Carrier knob for disc from back of sphere.
N. Scale of degrees (radial).
O. Scale of degrees (circumferential).
P. Index hand for marking O.
Q. Knobs for rotating A.
R. Milled nuts for taking stand apart for packing.
S. Lyre-shaped stand for supporting rotating section.

and size of the scotoma can be more quickly and accurately mapped out, although the sweeping circular movements of the Priestley Smith scotometer show up circular defects more easily.

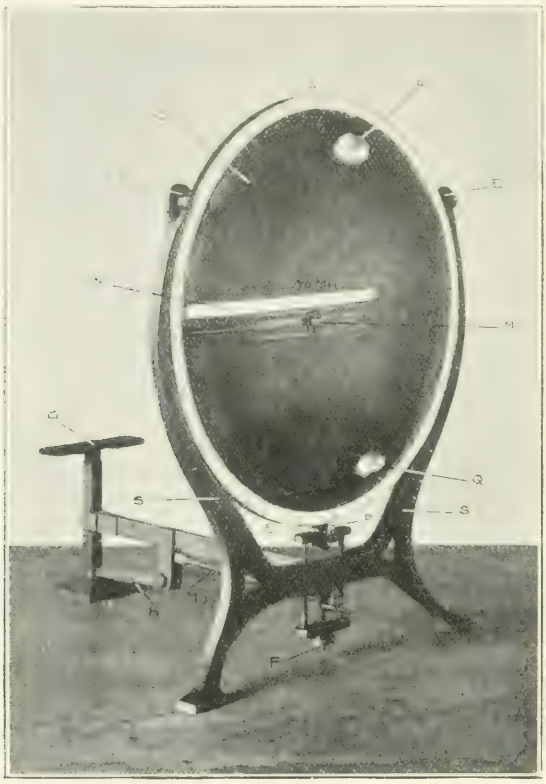

FIG. 3.—Bardsley's Scotometer.

(For lettering, see p. 701.)

(*c*) *Berry Haycraft's Scotometer* (Figs. 4 and 5).—In this apparatus the screen consists of a black metal plate, over which a nail bearing white or coloured test objects can be made to travel in both vertical and horizontal directions by means of a screw.

The dimensions of a scotoma can be quickly and accurately mapped out and recorded by placing a chart and transfer paper in a compartment made for the purpose at the back of the screen (Fig. 5), and pressing the nail against the paper as the limiting points are defined.

Professor Haycraft used this apparatus to demonstrate that the margin of the blind spot is colour blind, *i.e.*, all colours appear grey at the margins of the blind spot, and as the colours are moved away from this area, they become recognisable in the following order: blue, yellow and green, red.

The size of the test objects can be varied, but 1 mm. or 2 mm. objects are generally used. The apparatus will record about 10° on the inside and 20° on the outside of the fixation point, and the screen is turned round, so that the long side is on the outside for each eye.

Holth's Method.[8]

This is a somewhat rough and ready test for central scotoma. The red end of a Norwegian match (damped) may be used as a test for scotoma for red. More detailed information can be obtained by using three matches. The centre

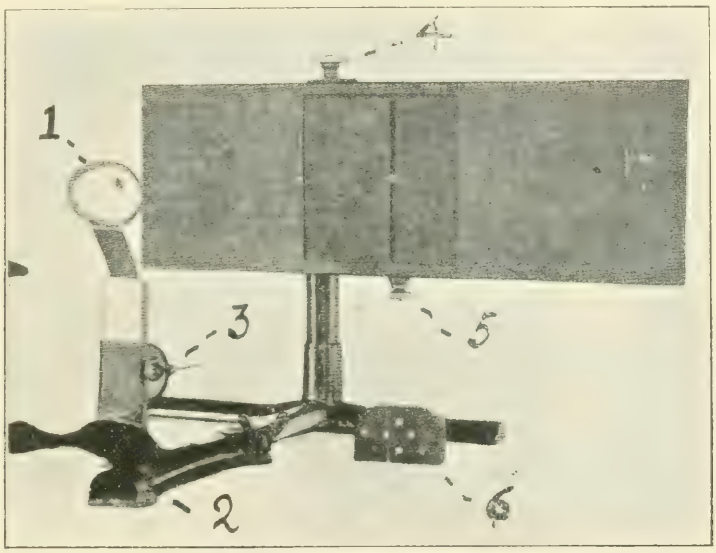

FIG. 4.—Haycraft's Scotometer.
Determination of the area of the blind-spot arranged for use with the right eye.

match is stuck vertically into the partially opened end of the box, and the other two, with their heads in the same horizontal line as the central one, are fixed obliquely at each corner of the box (Fig. 6). By getting the patient to fix

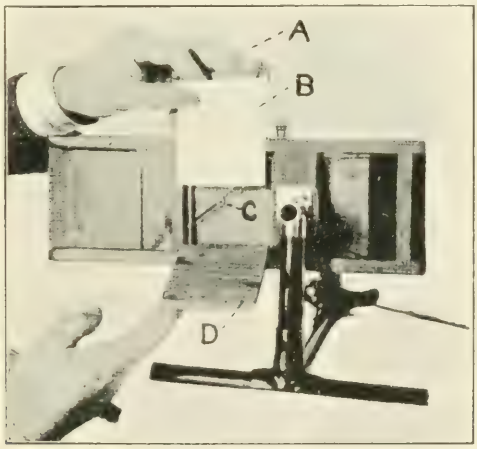

FIG. 5.—Haycraft's Scotometer.
Showing the reverse side of the instrument.

the central match and to note the colour and comparative brightness of each match head, we can discover whether the scotoma is central or paracentral (Fig. 8). A more permanent form of this test consists in having the colours, *e.g.*, rose

coloured wax, fixed in the handle of an ophthalmoscope or in an ebonite rod (Fig. 7). The spots are 5 mm. in diameter and 4 cm. apart, on the reverse side a similar series of holes are filled with grey-blue wax, which is meant to be used in testing for scotomata in colour blind patients (Fig. 7). The

Fig. 6.

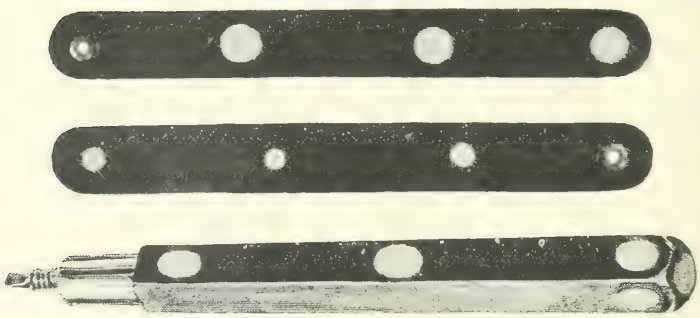

Fig. 7.

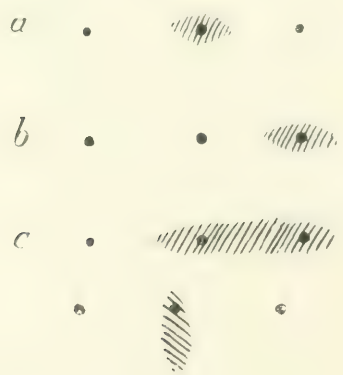

Fig. 8.

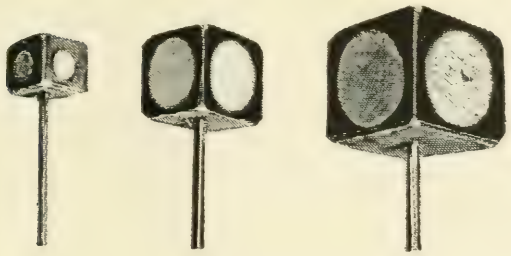

FIG. 9.

latter can normally see the blue part of the colour, but if there is a central scotoma they call one or two of the spots "grey" or "smoke" and the nasal one alone "blue." For perimetry Holth uses square ebonite blocks (fixed on hat pins) the four sides of which contain holes, 5 mm., 10 mm. and 15 mm. square, fitted with white, rose, blue, and green wax (Fig. 9).

II. Perimetry in Imperfect Fixation.

In cases where fixation is defective, the discovery and mapping out of scotomatous areas by means of the ordinary perimeter is a matter of considerable difficulty.

The methods employed to overcome these difficulties consist in either exposing the test object for such a short period that the eye has no time to wander, or in making use of the sound eye to control the movements of the defective one.

On the former principle is based the Hess Method[9] which is thus described.—

"Little white discs arranged in regular rows on a black ground are made visible by momentary illumination. One or more of the discs can be made visible by covering them with black paper. The patient is placed at such a distance that a smaller or greater number of the discs will be pictured on the region of the retina undergoing examination, and has to state whether, at the moving of the shutter all the discs are visible or not, how many are absent and what are their respective positions. If this experiment is repeated several times and the patient always gives correct answers, a scotoma can certainly be excluded from the area under consideration. If, in an investigation, the white disc, whose image would fall on the blind spot of a normal eye, be covered, the patient cannot see that it is covered and makes a false statement if he tends to complete the picture. Every normal eye has, at a point corresponding to its foveal region, a blind spot with a sufficiently lowered illumination, and a relative scotoma when the illumination is less lowered (lessened foveal sensitiveness of the eye adapted to dark). If 16 or 25 little white discs are arranged in four or five rows of 4 or 5 each, on a black background, at a satisfactory distance apart, and placed at such a distance from the eye that the image of one will fall on the entrance of the optic nerve, that disc will appear absent from the row, the pattern will appear defective and will not be completed. The same will be found true of the foveal scotoma by reduced illumination."

Scrini and Fortin[10] describe another method in which the use of the amblyopic eye only is required, and demanding only a relative fixation. A

small object, such as a pin-head, is moved round a white spot on a black ground. The amblyopic eye follows the movements of the pin, and if the white spot always disappears when the eye is in a certain position, we assume there is a central scotoma at that spot.

It has been contended that only a positive scotoma can be demonstrated by Hess's method, and the methods in which binocular fixation or fixation by the sound eye is employed are considered to be more trustworthy, especially in cases of negative and relative scotomata.

Schlösser's Method.[11]

This is based on the principle that "if one eye be covered with a red glass, then this eye cannot recognise a properly selected green, *i.e.*, its complementary colour; in the binocular field, where green is recognised, it is done by the uncovered eye" (Hirschberger).

The field is taken on an ordinary perimeter, the fixing (sound) eye is covered with a red glass, and fixes a green centre spot which will appear black; the test object is green (or complementary colour to the glass over the fixing eye).

If at any point of the arc the eye ceases to see the green clearly, there is in the corresponding region a relative or absolute scotoma for green. The examination must be repeated for each fundamental colour.

With a white test object an absolute scotoma is indicated when it assumes a red colour, and a relative scotoma when it appears grey.

It is necessary to work with a moving object, in order to avoid local adaptation.

Heine[12] adopted this method in his investigations on "Central Scotoma in congenital Amblyopia."

Haitz's[13] Stereoscopic Cards.

These are easier of application than Schlösser's method, but they do not allow of investigation beyond a radius of 10°; or 20° when the patient fixes the end of one of the meridians instead of the centre of the figure.

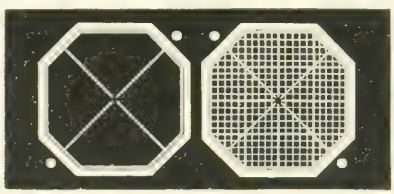

Fig. 10. Fig. 11.

On the cards are drawn geometrical figures in silver-grey on a dark background, while small discs, placed above one figure and below the other, enable the surgeon to determine whether binocular fusion is complete. For small central scotomata the figures consist of circles with diagonal lines which are interrupted by a central hiatus on one side and a white or coloured spot on the other. Larger cards or campimeters are used in the elucidation and mapping out of the central field. The figures are octagonal, the peripheral contours being in

thick grey lines, the diagonal and degree lines being drawn thinner. Lines indicating degrees are only drawn on one of the figures, and this one is always placed in front of the eye to be examined (Fig. 10).

The cards are placed in a Holmes stereoscope, and the field is taken in the usual way, the test objects being $1\frac{1}{4}$ mm. and 2 mm. square, and the holders the size of a needle. Heidelberg coloured papers make the best test objects. In testing, it is well to avoid taking the test object along the peripheral and diagonal fusion lines.

Davis[14] found that by arranging a series of discs on these cards according to Hess's method, and getting the patient to fix one end of the diagonals, the disc corresponding to the blind spot disappears. This phenomenon he finds most easily demonstrated with four discs 5 mm. in diameter, one occupying the centre of each of the four triangles formed by the diagonal lines of the Haitz campimeter.

Tomlinson's Scotomograph with Stereoscopic Fixation.[15]

In this instrument the test object used for exploring the sensitiveness of the retina consists of the image of the spot, used as the fixing-point of the

FIG. 12.—Tomlinson's Scotomograph.

eye, reflected in a mirror hinged near the eye. The mirror is hinged within a closed casing, having at one end an aperture for the eye to be tested to look through, and at the other a plate pierced with a small hole that is directly visible and serves as a fixing point for the eye. The other eye has also its fixing-point which is the same size, and both are fused into one giving

stereoscopic fixation. An image of this small hole is reflected from the mirror whatever position it occupies. By keeping the casing stationary and moving the mirror, the reflected image moves radially over the retina; by leaving the mirror fixed at any given angle and rotating the casing, the reflected image describes a circular path over the retina. By repeating this process, at, say, 15°, 20°, 25°, and 30° circles, a very searching test for Bjerrum's sign can be made, especially if the smallest aperture be employed and the light be reduced.

To test the colour fields, small plugs, fitted with coloured gelatines, are inserted in the light aperture of the chart plate. There is also an ingenious automatic registering appliance, whereby the defects in the field are graphically recorded on a chart.

Joseph–Pigeon Method.[16]

To obviate the fixation difficulty, Joseph has resorted to the dihedral stereoscope of Pigeon[17]. This stereoscope being devoid of lenses, distortion is avoided, and it allows of the wearing of ametropic correction, and the field can be explored beyond the 15° circle or so, which is all that can be examined in Holmes's stereoscope.

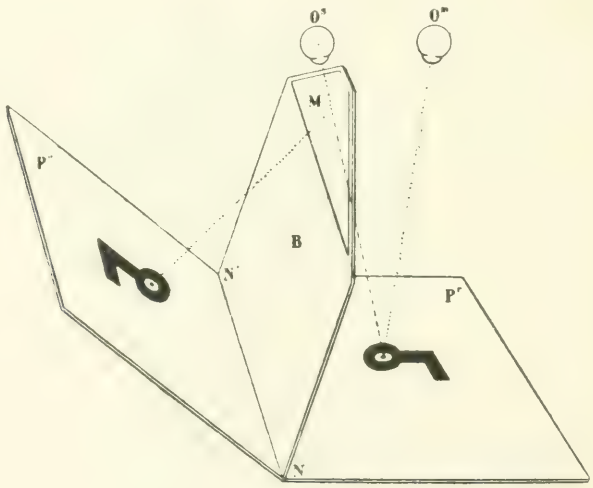

FIG. 13.—Pigeon's Stereoscope.

Pigeon's stereoscope consists of two planes of wood (P^1, P^1) hinged together and set at an angle of 140°, and a third plane (B) articulating with the above-mentioned two at the hinge and bisecting the angle On one side of this central plane and near its upper part is a small triangular plane mirror (M) in which the chart, affixed to the surface of one of the outer planes, is viewed by one eye when the apparatus is in use. The other chart, affixed to the inner surface of the second lateral plane, is viewed directly by the second eye. The charts are similar to those used in ordinary perimetry, but have only the eight principal meridians marked, so as to aid fusion. The lines are grey or reddish-brown on a black background. Scotomata are mapped out by means of small white or coloured test objects on a black-handled carrier. In cases of deviation of the optic axes, the charts

can be moved until fusion is attained. The point of fixation can also be displaced, so that more eccentric zones may be explored. The ordinary commercial form of this stereoscope ("Dixio") allows of exploration of the field up to 25° from the centre. The illumination of the charts can be varied, so that fusion is assisted in the case of unilateral amblyopia, and so that a relative scotoma is made more easily appreciable to the patient.

von Szily's Method.

von Szily secures the fixation of both eyes by the use of a funnel-shaped tube which can be attached in the proper position to any perimeter. The better eye fixes through this tube, but is excluded from all but central vision, and the field of the amblyopic eye can then be taken in the usual way. Herczogh[18] has described this apparatus, and found it satisfactory in practice.

III. THE PERIPHERAL FIELD.

The limitations of the normal peripheral field of vision are pretty well agreed upon, but it may be justifiable to refer here to **Groenouw's method** of testing the visual power of the peripheral portions of the retina, since, although no doubt well-known, it does not seem to have been extensively practised.

[19]Groenouw's method is designed to test the visual minimum and form sense of the retina. In the first case a white card 6° wide, with a small black dot in its centre, is moved centripetally along the arc of a perimeter until the patient recognises the presence of the black mark. The recognition of the black spot on a white background is not a function of the light sense, as considerable variations in contrast between the object and the background make very little difference. The spots used vary from $\frac{1}{4}$ mm. to 4 mm. each, and the lines joining the points where each spot becomes visible are called "isopters" and run almost parallel to the limits of the field of vision. The examination of the field by this method often demonstrates defects which are not evident by the ordinary methods. The form sense of the peripheral parts of the retina is estimated by using two black marks on a white ground, separated by an interval equal to the diameter of each. The investigation of this function has not led to any decided results.

Williams's Method.

Williams[20] has described a convenient method to test the visual fields for colour without the use of a perimeter. "The patient sits with his back to a good light looking fixedly at a point in the distance. He is directed to signal as soon as he perceives any movement. The visual field is then approached by the observer's hand, which holds alongside and parallel two objects coloured of an intense, pure, bright-red and blue respectively. After the patient signals he is asked to signal again as soon as he perceives any colour, while the centre of the field is very slowly approached. The observer then stops the movement and asks what colour is seen. To corroborate, the movement is then continued until the other colour is also seen."

This method, in the hands of the writer, was found to be a quick and trustworthy method of demonstrating the inversion and interlacing of the colour fields in cases of increased intracranial tension from tumours, etc.

Notation of the Visual Field.

Several suggestions have been made to obviate the necessity of recording the visual fields on charts, which take up a considerable amount of space in the case-book and are somewhat expensive to reproduce in printed journals.

Armaignac's[21] method is based on de Grandmont's suggestion, which consists in indicating only the four principal meridians—external, superior, internal, and inferior, by the formula E.S.I.I., and a field would be recorded thus: L.E.—E.S.I.I.=90—45—40—50, or, more simply, by the tens only —E.S.I.I.=9445. The greater the extent of the field, the higher did this number become.

Armaignac doubles the number of meridians measured, indicating, as an index after each of the chief meridians, the numerical value of the intermediate sector, *e.g.*, $9^6\ 4^4\ 4^4\ 5^7$ indicates that the field of the supero-external meridian is 60°, the supero-internal 40°, etc.

Further elaboration may be got by placing another figure to the left of each of the chief figures, so as to indicate the value of the meridian which precedes the latter by 30°, *e.g.*, ${}^{8}9^{7}\ {}^{6}5^{4}\ {}^{4}4^{6}\ {}^{7}8^{8}$. The meridians are recorded clockwise in the left eye, but in the opposite direction in the right eye. Radii of a circle may be used to express the formula more graphically.

Lopez[22] has suggested a formula for the visual field, in the form of a fraction, of which the numerator represents the upper half of the field and the denominator the lower half. The meridians on the charts are numbered from right to left for both right and left eye, and the diameters have the same number at each end except the horizontal diameter which is O at the right hand side and 180° on the other. Normal fields would be recorded thus:—

$$\text{R.}\ \frac{90\ \ 50}{60\ \ 70} \qquad \text{L.}\ \frac{60\ \ 50}{90\ \ 70}$$

When the field in any but the principal meridians has to be recorded, the meridian is indicated by the number and ° sign. and a scotoma is indicated by a — sign, the number following representing its extent from the centre, *e.g.*,

$$\text{R.}\ \frac{90—20}{60—\ 8} \qquad \frac{50—\ 8}{60—12} \qquad 45°\ \ \frac{50—\ 8}{55—10}$$

When the scotomata are multiple and the peripheral field is irregular, the formula becomes so complicated that it would almost be necessary to transfer it to a chart before it could be appreciated.

These methods do not appear to have any advantage over the method suggested by Priestley Smith,[23] in which the initial letter for the eye is surrounded by the number of degrees the field extends in the different directions the figures are placed, *e.g.*, a normal field would be written:—

$$\begin{array}{ccc} & 55 & \\ 90 & \text{L} & 55 \\ & 65 & \end{array}$$

or more fully

$$\begin{array}{ccc} 70 & 55 & 55 \\ 90 & \text{L} & 55 \\ 80 & 65 & 58 \end{array}$$

Central scotomata would appear thus:—

$$\begin{array}{lccc} \text{(Periphery normal)} & 8 & 7 & 8 \\ & 18 & \text{L} & 8 \\ & 10 & 7 & 8 \end{array}$$

These methods are all unsatisfactory where the field is complicated, but are useful when details are superfluous.

(*To be continued.*)

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CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—BACTERIOLOGY.

(1) Stargardt, K.—The pathogenic power of the Xerosis bacillus. (Zur Pathogenität des Xerosebazillus.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(2) Duclos.—Researches into the bacteriological condition of the conjunctiva in the course of cataract operation. (Récherches sur l'état bactériologique de la conjonctive au cours de l'opération de la cataracte.) *La Clinique Ophtalmologique*, 10 juillet, 1911.

(1) **Stargardt,** of Kiel, has succeeded in inducing severe inflammation of the eyes of apes by injecting cultures of the Xerosis bacillus into the vitreous. In no case did he obtain any ocular reaction whatever when he injected similar cultures into the blood stream. A somewhat large quantity of the culture was necessary. A smaller dose produced an iridocyclitis with keratitis punctata, which disappeared and recurred. In these cases the inflammation was an infiltration with lymphoid cells, as described by Fuchs in sympathetic ophthalmia. Stargardt has found the bacillus in pure culture in a case of panophthalmitis, and at one time it was frequent at Strassburg in eyes which developed conjunctivitis soon after admission to the clinic. Some of the patients suffered from chronic iridocyclitis after operation.

Stargardt thinks that we must pay more attention to the Xerosis bacillus than we have hitherto done; it may be the cause of chronic iridocyclitis and even of sympathetic ophthalmia following operation.

T. HARRISON BUTLER.

(2) The conclusions come to by **Duclos,** of Paris, are:—(1) That the conjunctiva habitually holds the Xerosis bacillus, which is non-virulent, the staphylococcus albus, which is not very dangerous, and sometimes the Morax diplobacillus, which is without influence in the infective sequelæ. (2) That if one cannot obtain absolute asepsis of the conjunctival sac one can always see, following the cataract operation, phenomena of reaction or of infection which at the very least are slight. (3) That antiseptic *lavage*, rigorously carried out prior to operation, is capable of doing damage to the microbic flora of the conjunctival sac. (4) That the most dangerous germs are pneumococci. The results of the present research are in accordance with the conclusions come to by the author in 1905 on post-operative panophthalmitis, where, out of nine cases of infection, seven were pneumococcic, and two staphylococcic. (5) That certain local conditions, such as hyperæmia and chronic conjunctivitis, seem to favour infection, apart from bad condition of the lacrymal passages.

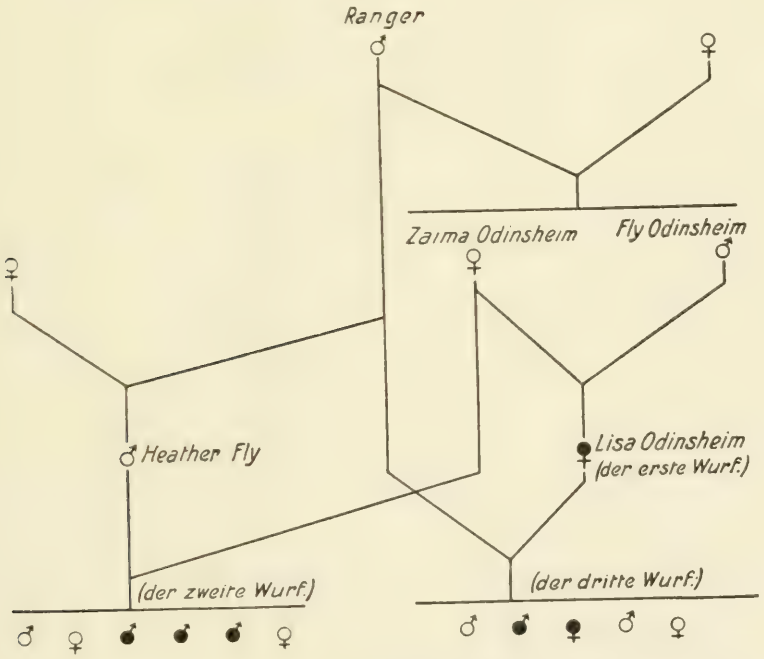
ERNEST THOMSON.

II.--COMPARATIVE PATHOLOGY.

(1) **Magnusson, H.—Retinitis pigmentosa and consanguinity in the dog.** (Ueber Retinitis pigmentosa und Konsanguinität beim Hunde.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft ii, S. 147, 1911.

(2) **Myashita, Soske.--On the clinical picture and pathological anatomy of experimental pneumococcal keratitis, and especially on the propagation and localisation of pyogenic cocci in the cornea.** (Ein Beitrag zum klinischen Bilde und zur pathologischen Anatomie der Pneumokokken-Impfkeratitis, besonders zur Ausbreitung und Lokalisation pyogener Kokken in der Cornea.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft ii, S. 131, 1911.

(1) In this interesting and important paper **Magnusson** (Malmö, Sweden) describes what is possibly the first well authenticated instance of retinitis pigmentosa in the dog. In the horse the disease has been recorded once by v. Biervlett and v. Rooy (*Arch. f. Ophth.*, 1864). In the present instance the disease occurred in a valuable breed of Gordon Setters, and the hereditary taint



seemed to be traceable to a certain unaffected imported dog called "Ranger." Being a valuable dog, some very close in-breeding was practised with him, so that degrees of consanguinity never approached in human relationships were attained. The first animal to be affected was the product of a pairing of a full brother and sister, the puppies of "Ranger," so that "Ranger" was the grandfather on both sides; whether any other member of this litter would have been affected it is impossible to say, as they were all destroyed. In the next litter "Ranger" was also grandfather on both sides, but the parents were only half-siblings; in this litter three dogs were affected, and one dog and two

bitches were unaffected. The third litter, to quote Don Quixote, "would puzzle a convocation of casuists to resolve their degrees of consanguinity"; let it be stated merely that "Ranger" was at once the father and the great-grandfather, and there let us leave it; the result in this case was two affected (a dog and a bitch) and three unaffected (two dogs and a bitch).

When the animal is about six months' old, evidence of visual disturbance commences in the form of night-blindness, which is practically complete in about a year. In one case all sight was lost in four years. Thread-like opacities may be present in the vitreous, the disc is grey, and the vessels are very small. Pigment is present in greater amount than normal, and encroaches on the tapetum lucidum; it has the form of a coarse network with processes and isolated patches. Bone-corpuscle forms, and the equatorial zones are not typically present.

Pathologically, there is profound degeneration of the retina, affecting especially its outer layers, but in places amounting to complete atrophy of the whole membrane. The choroid is atrophic and the choriocapillaris thin and its vessels are scanty, but the larger choroidal vessels are normal and the stroma pigment is unaltered. The pigment epithelium shows irregularity and proliferation, but the amount of pigmentation of the retina itself is slight as compared with the extensive atrophy, and is present chiefly where the retinal disease is very advanced. Nowhere was there any evidence of inflammation.

The above description, it will be seen, leaves very little doubt that the disease was true retinitis pigmentosa. The cases lend support to the observations of Lister and Stock, that in this affection the larger choroidal vessels are free from gross change. GEORGE COATS.

(2) After a preliminary account of work previously accomplished on the subject of experimental corneal infections, **Myashita** (Tokyo) relates his own researches with the pneumococcus. The most certain and uniform results were obtained by infecting the cornea with the heart blood from cases of pneumococcal septicæmia in the white mouse. The paper deals especially with certain peculiar infiltrates which appear in the periphery of the cornea on the 5th or 6th day. They are round or arcuate in shape, and form single, double, or triple partial rings, separated from one another and from the periphery by clearer cornea. In the subsequent course of the inflammation a pannus-like vascularisation invades the cornea from the periphery, and the outlines of the rings become blurred and ill-defined.

At first sight these rings would seem to correspond with the "delimitation ring" (*Einwanderungsring*) of Leber, but against this explanation there is the observation, first, that the cornea within the rings was not necrotic, showing at least that a concentration of toxine sufficient to paralyse the leucocytes is not necessarily sufficient to cause necrosis of the tissues, and that therefore the function of a delimiting wall of leucocytes is not necessarily the throwing off of dead material. Secondly, pneumococci were found not so much in the tissues enclosed by the rings, but rather in the rings themselves, the intermediate clearer corneal tissues being free.

It seems to follow from these observations that there is a transference of microbes within the cornea, and in the case of non-motile organisms, such as the pneumococcus, this can only occur from the presence of lymph currents, or by carriage within leucocytes. Myashita seems to have a difficulty in accepting the first hypothesis, because he believes the currents will be chiefly centripetal, towards the site of inoculation; but surely in an inflamed cornea there will be sufficiently active centrifugal currents carrying off waste products towards the veins. The notion contained in the second hypothesis seems to be that a leucocyte, having received a microbe into its protoplasm, hurries off,

mortally wounded from the field of battle, and being completely overcome at a certain distance behind the fighting line, gives up the ghost and sets its enemy free to pursue his fell purpose anew. On both hypotheses it is rather difficult to see why the infiltration is not more diffuse, and why the microbes should be laid down so uniformly at a certain distance from the centre of the cornea. However caused, this kind of transference of microbes may have an ætiological relationship with certain clinical types of isolated interstitial infiltrate commencing at some distance from the periphery

GEORGE COATS.

III.—INCLUSION DISEASES OF THE CONJUNCTIVA.

(1) **Wolfrum.—On the inclusion diseases of the human conjunctiva.** (**Ueber die Einschlusserkrankungen der menschlichen Bindehaut.**) *Bericht der Ophthalmologischen Geselischaft*, Heidelberg, 1910.

(2) **Herzog, H.—On the ætiology of trachoma.** (**Ueber de Ætiologie des Trachoms.**) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(1) It has now been abundantly proved that the cell inclusions present in trachoma are also to be found in the cells of the infantile conjunctiva, which is then affected by a catarrh which may approach gonococcal conjunctivitis in severity, although, in general, the inflammation is of a more benign nature. **Wolfrum**, of Leipzig, has examined twenty cases of this nature. The cell inclusions are exactly similar to those found in trachoma, but far more cells are affected than is usual in any case of trachoma but the very worst and most neglected. Trachoma is essentially an enormous increase in the plasma cell infiltration which is normally found in the adult conjunctiva ; the follicle is now known to be of secondary importance. The infantile conjunctiva is not infiltrated with plasma cells. The infiltration in adults must be considered as a reaction to chronic irritation.

In gonoccocal conjunctivitis we find a different picture. General œdema of the tissues is the chief characteristic of this disease. Epithelial cells are separated from each other and even thrown off in masses. In addition, we find an enormous infiltration with leucocytes, with a few plasma cells here and there. Inclusion blennorrhœa is quite different. There is a layer of fibrin, of leucocytes and detached epithelial cells upon the surface which contains many plasma cells ; this process may go so far that it is difficult to find normal epithelial cells. The cell infiltration is never so marked as in gonococcal blennorrhœa, and consists almost entirely of plasma cells. The condition suggests trachoma, but there are no follicles. As Herbert has pointed out, however, the infantile conjunctiva contains no adenoid tissue, and is therefore probably incapable of forming follicles. In one case, however, a severe one, follicles were found six weeks after birth. Wolfrum thinks that the two diseases, inclusion blennorrhœa and trachoma, are really identical.

In the discussion which followed, Herzog said that he could detect diplococci in several of Wolfrum's specimens. T. HARRISON BUTLER.

(2) As now well known, **Herzog,** of Berlin, holds that the cell inclusions found in trachoma are in reality microgonococci, involution forms of gonococci. In the present paper he brings forward further evidence in favour of his view. Among other experiments he inoculated a *confrère* with a pure culture of

gonococci, (it is not stated whether the culture was an old one containing involution forms or not), and succeeded in finding typical cell inclusions. The appearances seen in the specimens taken from this eye, and those found in a case of fresh trachoma, are well shown in some very excellent drawings. These appearances are further contrasted with those seen in a slide made from an old culture of gonococci. We could wish that Herzog's views were as clearly expressed in his writings as they are in his drawings. It is unnecessary to discuss all the points raised in the paper, for quite recently we very carefully reviewed Herzog's monograph on the subjects in this journal.* It is, however, certain that his views cannot be lightly passed over; they are capable of proof or disproof; but, as we have stated before, the work must be done in Palestine or Egypt. The severest trachoma seen in Europe is, in our experience, mild compared with the disease as seen in the near East. In Jerusalem it is so severe that trichiasis operations have to be performed on mere infants. The material is unlimited, and only awaits careful investigation.

T. HARRISON BUTLER.

IV.—THE BLOOD IN DISEASES OF THE EYE.

(1) **Gradle, H. S.—On the diagnostic and prognostic value of lymphocytosis in traumatic iridocyclitis.** (**Ueber die diagnostische und prognostische Bedeutung der Lymphocytose bei Iridocyclitis traumatica.**) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(2) **Gradle, H. S.—Lymphocytosis as a diagnostic and prognostic symptom in case of irido-cyclitis after perforating injury.** *Archives of Ophthalmology*, November, 1910.

(3) **Rasquin.—Considerations on the value of analysis of the blood in ocular affections.** (**Considérations sur la valeur de l'analyse du sang dans les affections oculaires.**) *Ann. d'Oculistique*, février and mars, 1911.

(1) A large number of examinations of eyes affected with sympathetic ophthalmia convinced **Gradle**, of Chicago, that the infiltration consisted almost entirely of lymphocytes. This peculiar kind of inflammation must be caused by the specific action of an hitherto unknown cause of infection. Whether this lymphocytosis is a local tissue phenomenon, or is also present in the blood, has up to now not been discussed.

In consequence, during the winter of 1907, Gradle undertook the examination of the blood in cases of perforating injuries followed by iridocyclitis, and also in cases of non-traumatic iridocyclitis. Blood was taken from the pinna of the ear and stained by Jenner's method for six minutes; 200-300 white blood corpuscles were counted. It was soon seen that the essential point was the relationship between the numbers of polynuclear leucocytes and the mononuclear leucocytes. The total number of leucocytes was unimportant.

The cases fall into three groups: the first contains six cases of traumatic iridocyclitis of a type which threatened to cause sympathetic ophthalmia. A careful bacteriological examination of these cases gave a negative result, except that in two cases spirillæ were detected. In one case the globe was examined anatomically, and Fuchs' characteristic inflammation found. In these cases the lymphocytes formed 30-45 per cent. of the total white cells.

*THE OPHTHALMOSCOPE, Vol. VIII, 1910, p. 931.

The second group contains eleven cases of perforating injuries, in which no danger of sympathetic ophthalmia was anticipated. Six of them healed normally, four had to be enucleated, and in one case the whole contents of the globe prolapsed. In all these cases no lymphocytosis was present.

The third group contains fifteen cases of non-traumatic iridocyclitis. No lymphocytosis was present.

The cases of slowly progressive iridocyclitis showed a regular increase in lymphocytes of from 20 per cent. to 80 per cent above the normal, a fact certainly having some bearing upon the cause of sympathetic ophthalmia.

Discussion.

Wolfrum found a lymphocytosis in two out of four dangerous cases of post-perforative iridocyclitis. He considered that blood examinations should be made in all cases of post-operative iridocyclitis that we may obtain some certainty regarding the occurrence of leucocytosis

Gilbert said he had found a lymphocytosis, not only in perforative iridocyclitis, but in that caused by pneumococci and other organisms. He could therefore obtain no information regarding the probability of a sympathetic ophthalmitis from his results.

Gutmann wished to know whether these patients with lymphocytosis had any rise of temperature, a rise which he had noticed in cases of cyclitis which threatened to affect the second eye. Gradle answered this question in the negative. Gradle, Senr., had seen a lymphocytosis in a case of post-traumatic cyclitis.

Gradle, Junr., in his answer to questions, said that he had found no increase in eosinophil cells, and that the patients were healthy in other respects.

T. HARRISON BUTLER.

(2) **Gradle,** of Chicago, has examined the blood in 30 cases of irido-cyclitis (traumatic and non-traumatic) or perforating injuries. He found a marked increase in the mononuclear elements, at the cost of the polynuclear, in cases only where there was danger of sympathetic ophthalmia. The patients were all afebrile, resident at the clinic, and the examinations were always made at 10.30 a.m. After operation, the blood count, in the cases affected, dropped to normal after a short time, and remained there. The author thinks, if his findings are confirmed in a larger series of observations, that a differential blood count will be of great importance in the prognosis of perforating injuries and the decision when to enucleate. ROSA FORD.

(3) **Rasquin** has endeavoured to ascertain what appreciable changes in the blood accompany ocular affections, and what value can be assigned to them. As physical and chemical investigations do not at present seem likely to lead to useful results, he has confined his attention to microscopical and biological changes. After giving a *résumé* of the references to the subject in medical literature, he describes in detail his own investigations, the results of which may be summarised as follows :—

1. Acute microbic affections of the visual apparatus are accompanied by an increase in the number of neutrophile leucocytes which is proportionate to the extent of the inflammatory focus and the intensity of the process, and increases until the illness reaches its acme. During the period of aggravation the proportion of eosinophiles is reduced. The subsidence of the disease is, on the contrary, characterised by a return of the neutrophiles to their normal proportions, with a reappearance, or even increase, in the eosinophiles. Thus, in a case of perforating wound of the eye, the presence of neutrophile leucocytosis with reduction of the eosinophiles would be a reason for suspecting panophthalmitis, and the same principle can be applied to the diagnosis of cerebral abscess in cases of papillœdema. Similarly, in acute conjunctivitis, diminution in the

neutrophiles with increase in the eosinophiles would be a sign of improvement, while rapid diminution in the neutrophiles without reappearance of the eosinophiles would indicate that the organism had ceased to react.

2. Parasitic affections of the eye cause a certain amount of eosinophilia.

3. Syphilis with ocular manifestations often causes changes in the blood. These are, as a rule, anæmia and lymphocytosis, but vary according to the period of the disease and the influence of treatment. During the secondary stage there is reduction in the hæmoglobin and in the red corpuscles. These changes, which are less constant in the tertiary stage and in the hereditary form of the disease, tend to disappear under mercurial treatment. This disappearance commences with regeneration of the red corpuscles, which may be accompanied by a further reduction in the amount of hæmoglobin, and is often accompanied by the appearance of abnormal erythrocytes, especially macrocytes. In syphilitic tabes there is always a diminution in the hæmoglobinuric coefficient even after mercurial treatment. This characteristic may be of value in the diagnosis of simple atrophy of the optic nerve.

4. Tuberculous and scrofulous affections of the eye have a variable influence, but there is often a predominance of mononuclear cells.

5. The eosinophiles are increased in number in post-scarlatinal albuminuric retinitis but not in the other forms of the disease.

6. In simple glaucoma there is usually slight eosinophilia.

7. In retinitis pigmentosa there is intense anæmia with pronounced leucocytosis.

8. In diabetic cataract there is neutrophile leucocytosis, but this peculiarity is not present in the other forms of cataract.

9. In ocular lesions caused by leukæmia and the essential or secondary anæmias examination of the blood cells clinches the diagnosis.

10. In cases of exophthalmos due to cancer, sarcoma, and Basedow's disease, the variations in the blood typical of these conditions are absent or badly marked.

11. Examination of the opsonic index gives no results of interest.

12. Microbic ocular affections do not seem to determine in the blood any modification capable of producing agglutination except when they are localisations of diseases attacking other parts of the organism.

13. The Wassermann reaction is positive in a good number of syphilitics with ocular manifestations. When it is present, it confirms the diagnosis, but its absence does not exclude syphilis. Mercurial treatment diminishes the percentage of positive reactions, which is also influenced by the stage of the disease.

14. Attempts to discover organisms in the blood, by smears or cultures in cases of diphtheritic conjunctivitis, acute catarrhal conjunctivitis, panophthalmitis, anthrax, and secondary syphilis with iritis, were unsuccessful except in one case of syphilis.

Finally, the author concludes that the examination of the blood gives information which is of interest with regard to the pathological histology of certain ocular diseases, and of diagnostic and prognostic utility in certain cases ; but that further observations are necessary to establish its true value.

R. J. COULTER.

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Literature.

The second number of "Ophthalmic Instruments" is now being issued, the contents of which are as follows: The errors of Spectacle lenses—The Bardsley Scotometer—Fusion tests—Circular scotometry—The making of Spectacle lenses—Bifocal glasses—The measurement of inter-pupillary distance—Ophthalmic illumination—Test types—Lens systems—The measurement of corneal curvature. As a supplement a copy of Series I. of the new fusion pictures, designed by Mr. H. H. B. Cunningham, of Belfast, is issued with each copy of "Ophthalmic Instruments." It was not found practicable to send the spectacles with these pictures, but we shall be pleased to send them on application.

V.—TUBERCULOSIS AND EYE DISEASES.

(1) Kellermann, Max.—On tuberculous panophthalmitis at the end of a puerperium. (Ueber tuberkulöse Panophthalmie im Anschluss an ein Puerperium.) *Zeitschrift für Augenheilkunde*, November, 1908.

(2) Cohen, Martin.—Report of a case of tuberculous scleritis. *New York State Journal of Medicine*, June, 1909.

(3) Stirling, J. W.—Tuberculosis in eye diseases. *New York State Journal of Medicine*, November, 1909.

(4) Natanson, A. N.—Two cases of solitary tubercle in the posterior half of the globe in early infancy. (Zwei Fälle von solitärer Tuberkulose des hinteren Augenabschnitts im frühen Kindesalter.) *Klin. Monatsbl. f. Augenheilkunde*, Februar, 1910.

(5) Kerry, Richard.—Five cases of tuberculosis of, and about, the eyes. *Ophthalmology*, April, 1910.

(6) Lawford, J. B. — Drawing of a case of episcleral tubercle (experimental evidence of tubercle). *Transactions Ophthalmological Society U.K.*, Fasc. 2, 1910.

(7) Lakah, C.—The signs, diagnosis, and treatment of certain forms of tuberculous iritis and irido-choroiditis. *La Clinique Ophtalmologique*, 10 juillet, 1910.

(7A) Brewerton, E.—Chronic tuberculous irido-cyclitis. *Ophth. Review*, August, 1910.

(8) Sauer, H.—The clinical picture of the anterior half of the eye when tuberculosis has subsided. (Das klinische Bild der abgelaufener Tuberkulose des vordern Augapfelabschnittes.) *Inaugural Thesis for the M.D. Rostock.* Adlers Erben, 1910.

(9) Axenfeld. — The part played by tuberculosis in the ætiology of intra-ocular hæmorrhages and in vascular and proliferating lesions of the retina. (Le rôle de la tuberculose dans l'étiologie des hémorragies intraoculaires et les altérations vasculaires et proliférantes de la rétine.) *Bull. de la Société Belge d'Ophtalmologie*, No. 29, 1910, p. 115.

(10) Jessop, W. H. — The ophthalmoscopic appearances of chronic tubercle of the choroid. (Les aspects ophtalmoscopiques de la tuberculose chronique de la choroïde.) *Bull. de la Société Belge d'Ophtalmologie*, No. 29, 1910, p. 61.

(11) Verhoeff, F. H.—The histological findings in a case of tuberculous cyclitis, and a theory as to the origin of tuberculous scleritis and keratitis. *Archives of Ophthalmology*, September, 1910.

(12) Wessely, C.—A contribution to our knowledge of conjunctival tuberculosis. (Beitrag zur Kenntnis der Konjunctivaltuberkulose.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(12A) Mathewson, Geo. H.—A case of miliary tuberculosis of the choroid. *Montreal Medical Journal*, December, 1910.

(13) Axenfeld, Th. and Stock, W.—On the importance of tuberculosis in the ætiology of intraocular hæmorrhages and proliferating changes of the retina, especially on periphlebitis retinalis in tuberculous patients. (Ueber die Bedeutung der Tuberkulose in der Ætiologie der intraokularen Hæmorrhagien und der proliferierenden Veränderungen in der Netzhaut, besonders ueber Periphlebitis retinalis bei Tuberkulösen.) *Klin. Monatsbl. f. Augenheilkunde*, Januar, 1911.

(14) Jessop, Walter H. H.—Solitary tubercles of the choroid. *Trans. Ophth. Society U.K.*, Vol. XXXI, Fasc. i, 1911, p. 34.

(15) Lafon.—On tuberculoma of the palpebral conjunctiva (neoplastic tuberculosis). [Le tuberculome de la conjonctive palpebrale (tuberculose à forme néoplastique).] *Ann. d'Oculistique*, avril, 1911.

(16) Windbiel, J. E.—Eye tuberculosis and its treatment. *Ophthalmology*, April, 1911.

(17) Oreste.—Tuberculous sclero-keratitis (etiology, pathological anatomy, and prognosis). [Scléro-kératite tuberculeuse (étiologie, anatomie pathologique, prognostic).] *Ann. d'Oculistique*, septembre, 1911.

(2) The principal point about **Cohen's** case, in which two nodular masses involving the anterior scleral tissue were accompanied by iridochoroiditis, is that syphilis and rheumatism were practically excluded by the absence of result from treatment and by the absence of the Wassermann reaction, while tuberculosis was suggested by the clinical appearance and by a markedly positive von Pirquet reaction. ERNEST THOMSON.

(3) This communication by **J. W. Stirling,** of Montreal, centres chiefly around von Pirquet's inoculation test for tuberculosis, and its use in eye work. A case of Parinaud's conjunctivitis is mentioned where the patient later developed pulmonary tuberculosis, and the question is raised as to a possible tuberculous origin of the conjunctivitis. In nearly one-half of his cases of interstitial keratitis, Stirling has obtained a positive reaction to Pirquet's test. In phlyctenular keratitis, reaction was "very uncertain, and it would appear as if a very small percentage of the cases were tubercular in origin." By Axenfeld and Stock it has been shown that recurrent intraocular hæmorrhages in young subjects are due to tuberculous disease of the choroidal and retinal vessels. In one of Stirling's cases the patient had previously suffered from pulmonary tuberculosis, and in another, the patient, apparently robust at the time the hæmorrhages occurred, died within two years from acute tuberculosis.

SYDNEY STEPHENSON.

(4) **Natanson**, in describing intraocular tuberculous growths in two children of the age of two years, gives prominence to the difficulties of diagnosis. It is, indeed, hard to see how in the first case the wrong diagnosis of glioma could have been avoided. The affected blind eye was totally devoid of inflammatory symptoms. The wide, rigid pupil emitted a yellow-white reflex, and the tension was increased. The eye was enucleated, and the optic nerve, appearing involved, was removed as far back as possible. Nearly the whole posterior half of the choroid, the disc, the optic nerve and its sheaths were changed into tuberculous granulation tissue. The sclerotic was found perforated at a point near the disc. In the second case, inflammatory manifestations led to the right diagnosis. At first they consisted only of a few posterior synechiæ, but when the child was seen again, two months later, the sclerotic was perforated near the limbus. The eye was then removed, and found to be filled with tuberculous masses, which had invaded the optic nerve as far as the lamina cribrosa. Accompanying anterior uveitis and early implication of the sclerotic help to differentiate the condition from glioma. C. MARKUS.

(5) **Kerry**, of Montreal, reports five cases treated by hypodermic injections of iodoform. One was an instance of tuberculosis of the lacrymal sacs; the others were suffering from interstitial keratitis, with more or less involvement of the iris. All were permanently benefited except one, a girl with keratitis and tuberculosis of the iris, who ceased attending before the treatment was completed. The treatment seems to have caused exacerbations of the local

conditions, with tubercle formation in the iris, the eye being better after each outbreak than it had been before. Relapses occurred in all the cases, but they yielded to repetition of the treatment, and at the date of writing, the disease had apparently been arrested in all, for periods ranging from six months to over two years.

The preparation used was "a mixture of twenty per cent. of powdered iodoform, with parafin oil containing 1 per cent. of carbolic acid." A quantity containing four grains of iodoform was injected hypodermically once or twice a week, according to the severity of the case. A. J. BALLANTYNE.

(6) In this case by **Lawford**, of London, experimental evidence of the tuberculous nature of an episcleral nodule (illustrated in a coloured plate) was obtained in the following way.—The nodule (which was about the size of a split pea, sharply defined and covered by conjunctiva, with dilated vessels, and situated in lower temporal region, some distance from the cornea) was dissected off, received into a sterile broth-tube, then halved with a sterile knife. One half was kept for microscopic examination. The other was inserted under the skin of the thigh of a guinea pig. In about two months the animal was killed, and an enlarged gland in the inguinal region was found to be caseous and to contain tubercle bacilli. The portion of the episcleral nodule showed the microscopic characters usual in tubercle. The experimental portion of the work was conducted by C. G. Seligmann.

ERNEST THOMSON.

(7) **Lakah**, of Paris, reports in detail three cases in which mercurial treatment, although it did some good, did not cure the disease in any complete sense, and in which a more attentive examination of the patient led up to a suspicion of tubercle as a possible cause. The cases seem to illustrate exceedingly well a class which clinically one has come across with some frequency, and therefore it will be well to condense them here.

A female, aged 36 years, who had always seemed healthy, complained of progressive visual defect for one year, up to the point of inability to read or to write. She was found to have bilateral irido-choroiditis. The irides were dull and lustreless, with numerous posterior synechiæ. There was a slight pupillary exudate. The media were cloudy, and the disc was hardly visible. V.R. 1/20. V.L. 1/50. Prolonged treatment by intravenous injections of cyanide of mercury resulted—after six months—in improvement up to 1/15 for the left, while the right became worse. Iridectomy on both, previous to which the left vision had again deteriorated. Improvement took place and patient could read and write: the injections were suspended. A few months afterwards, relapse occurred, with temporal headache. Mercurial injections were renewed, but this time without effect. At this point a hint was obtained from a cicatrix—hitherto unobserved—at the angle of the jaw. Iodogenol, thirty drops *per* day, brought about immediate and definite improvement, which has continued without interruption (Final V.A. not stated.)

A man, 18 years of age, healthy-looking and without any suggestive antecedents, complained of defect of the right eye and some intolerance of light. The signs seemed to be those of an ordinary iritis, and he was treated with mercury. The result was negative, even after a long trial. Close examination of the iris under high magnification now revealed fine blood-vessels on its surface. The mercurial was replaced by iodogenol, carnine Lefrancq, and friction with guaiacolised cod-liver oil. Gradually, the conditions improved and perfect vision resulted.

A female, aged 33 years, who had always had good health, was taken suddenly with pains in the head, most severe at the left temple, followed by injection and defective vision of the left eye. Under the influence of atropine,

mercurial friction to the temple, and aspirin internally, the pain and the redness of the eye disappeared, but the vision got worse, until the patient could count fingers only at a few centimetres. At this point, the reviewer gathers, the patient first consulted Lakah. She was treated by him with intravenous injections of mercury cyanide, a centigramme every second day. After eighteen injections, there was no improvement, and now close examination and magnification revealed, in addition to yellowish spots on the membrane of Descemet, the existence of fine thread-like vessels on the surface of the iris. The treatment was changed to that adopted in the previous case, but it was two months before real improvement began. The pupil yielded, the media cleared up, and "complete" vision was attained.

The author then points out that if in cases of iritis or kerato-iritis of doubtful ætiology, fine vessels are seen on the surface of the iris or in the corneal infiltrates, this constitutes almost a pathognomonic sign of bacillary infection. It must be remembered that these vessels are often invisible to the naked eye. Sometimes, the failure of ordinary treatment sets one upon the right road. There are, however, mixed cases where several ætiological factors play a part. In these mercurial and "anti-bacillary" treatment must be combined if a cure is to be obtained. ERNEST THOMSON.

(7A) **Brewerton**, of London, reports two cases extending over periods of many months; in both the vision was entirely lost after numerous inflammatory attacks resulting in intraocular changes of extensive character, although in one instance injections of tuberculin were given at intervals during twelve months. He advises the exclusion of syphilis by the Wassermann test, and the early use of tuberculin in all cases suggestive of tubercle.

A. H. PAYAN DAWNAY.

(8) In this thesis by **Sauer**, of Rostock, eighteen cases which had at one time suffered from tuberculous scleritis and parenchymatous keratitis, are very shortly described. The appearances which Sauer thinks characteristic are:— (1) Patchy or diffuse slate-grey discolouration of the episclera and limbus. (2) Increase of the white thickened stripes in the conjunctiva. (3) Irregular broadening of the limbus. (4) Chalk-white colouration of superficial opacities in the cornea. (5) Circumscript round opacities of the posterior layers of the cornea. (6) Anterior synechiæ in the iridic angle. (7) Deposits of masses of pigment on the surface of the iris. (8) Circular defects in the anterior layer of the iris. (9) Persistence of vessels filled with blood in the deeper layers of the cornea. (10) Persistent chemosis for which no other cause can be found. T. HARRISON BUTLER.

(9) In the opinion of **Axenfeld**, of Freiburg, many hæmorrhages into the vitreous body, apparently of idiopathic origin, often accompanied by retinitis proliferans, and occurring in adolescents and adults up to thirty years of age, are of tuberculous origin, as are certain alterations in the retina.

In proof of this assertion, Axenfeld quotes several cases:

CASE NO. 1.—A woman, aged 30 years, presented a sudden and complete hæmorrhage into one vitreous body. A few weeks later, a recent greyish-yellow focus was found in the choroid of the other eye, while the retinal artery and especially the vein running towards the choroidal *foyer* presented evidences of perivasculitis. The subcutaneous injection of tuberculine provoked general reaction and, in particular, a strong local reaction. Treatment by small doses of tuberculine led to cure of the choroidal lesion and to complete disappearance of the perivasculitis. The vitreous humour of the other eye became clearer and clearer, but some posterior synechiæ made their appearance. In this case Axenfeld believes that a chronic latent uveitis of tuberculous origin commenced by a hæmorrhage into the vitreous humour derived from the retinal vessels.

CASE NO. 2.—A lad of 16 years was affected with tuberculosis of various bones, the larynx, the nose, the lacrymal sacs, and the conjunctiva of one eye. The left eye was occupied by a conglomerate tuberculous tumour. The fundus of the other eye (kept under observation for many months) showed perivascular changes limited exclusively to the veins. There had been no hæmorrhages, although the affected eye was evidently predisposed to such. Uveal changes were absent.

In the author's opinion, the two foregoing cases demonstrate the existence of a retinal periphlebitis in tuberculous subjects. Axenfeld expressly does not speak of "tuberculous periphlebitis," inasmuch as that term implies the existence of true tuberculous foci—or, in other words, of tubercle bacilli around the veins. It is, in point of fact, extremely doubtful whether there is a true localisation of the bacilli in that sense. Axenfeld does not deny the possibility, since we have learned in the last few years that true tuberculosis may give rise to variable processes, even to those of a transitory nature. On the other hand, it is possible that the foci are the indirect consequences of the tuberculous state.

The case to be next narrated goes to show that even the commencement a latent tuberculous alteration may give rise to a proliferation in the retina, to a retinitis proliferans, in fact :—

Case No. 3.—The patient, a girl of 20 years, affected with pulmonary tuberculosis and with chronic irido-cyclitis with characteristic nodules. In the sound eye there gradually developed a true retinitis proliferans, concealing in part the vessels of the papilla. Later, that eye showed traces of serous uveitis, followed by some greyish nodules in the iris (visible only with the binocular loupe), along with dilated synechiæ. From the present standpoint it is of interest to note that there were several attacks of acute hæmorrhage into the vitreous humour of both eyes.

Axenfeld has examined other instances of recurrent vitreous hæmorrhage and of retinitis proliferans, and has found that most of these cases yielded a positive reaction to the subcutaneous injection of tuberculine. He, then, recognizes the existence of a hæmorrhagic form of ocular tuberculosis. He does not affirm that tuberculosis is the only explanation for obscure cases of vitreous hæmorrhage and retinitis proliferans and perhaps of other hæmorrhagic maladies of the retina. But he believes that tuberculosis is of greater importance in the ætiology of the affections in question than has hitherto been generally admitted. Marcel Danis.

(10) Ten years ago we recognized only a few rare cases as instances of solitary or conglomerate tubercle of the choroid. They were usually mistaken for gliomata, and the exact diagnosis was reached only after the eyeball had been removed. At the present time, on the contrary, we are inclined to include too readily under the name "tuberculosis" multiple affections of the choroid.

In the present communication **Jessop**, of London, sets out to enquire what are the ophthalmoscopic appearances that justify such a diagnosis. Most of the solitary tubercles of the choroid quoted in literature have been found in the neighbourhood of the optic papilla, and it is probable that in chronic tuberculosis of the choroid the dissemination has been by way of the lymphatics. Although the ophthalmoscopic appearances of chronic tuberculosis are characteristic, yet it is necessary to have recourse to other methods of clinical investigation, particularly to the tuberculin reaction. In many cases, also, it is desirable to seek for the Wassermann reaction, more especially as there exist mixed tuberculous and syphilitic forms of disease.

The author quotes four illustrative cases from his own practice.

Marcel Danis.

(11) **Verhoeff**, of Boston, Mass., reports the case of a woman, aged 34, who was treated by him for a second attack of scleritis, diagnosed as tuberculous. Injections of Koch's old tuberculin were followed by local and general reaction and by improvement in the local condition. Cure resulted in five months, but was followed, six months later, by a relapse, for which, at the patient's urgent request, the eye was removed. Examination of the excised eye revealed punctate tuberculous exudates on the surface of the ciliary body and its processes, all in the same stage of development, while the underlying part of the ciliary body was normal. There were also superficial punctate iritis,

papillitis due to pure œdema, and small foci of epithelioid cells in the cornea and sclera ; no tubercle bacilli could be found. Verhoeff concludes from the histological observations on this case that in tuberculous scleritis (anterior nodular scleritis), the infection reaches the sclera through the filtration angle. The infecting bacilli are derived chiefly from the superficial vessels of the ciliary processes, and are carried in the aqueous humour to the filtration angle. In tuberculous keratitis, the infection is also from the aqueous humour, either through metastasis or extension from foci about the filtration angle or from the foci of a preceding scleritis. Interstitial cyclitis is usually secondary to scleritis, while superficial cyclitis occurs as direct blood metastasis. Superficial tuberculous iritis, involving the posterior surface of the iris, may occur, and is analogous to superficial cyclitis, with which it is probably often associated.

ROSA FORD.

(12) **Wessely**, of Würzburg, describes his researches upon a case which presented the clinical picture of Parinaud's conjunctivitis.—A little girl, aged seven years, a butcher's daughter, was quite well until eight days before Wessely saw her. Her right eye then became swollen, and the glands on the right side of the face enlarged. It was found that the preauricular glands, those behind the ear, and the submaxillary glands were swollen to the size of walnuts. They were not painful. A chain of glands was enlarged in the neck on the right side. There was a free mucopurulent discharge from the right eye, and the upper lid was greatly swollen. When the upper lid was everted (a procedure which caused no pain), a papillomatous overgrowth was seen on the nasal third of the conjunctiva tarsi. These growths were the size of a lentil, and in one situation the margin was slightly ulcerated. Several nodules, the size of a pin's head, were seen among the papillomatous overgrowths. The condition, then, was apparently an example of Parinaud's conjunctivitis.

A search through the literature of this disease revealed the fact that Parinaud's conjunctivitis generally attacked butchers and their associates, or persons who had to deal with animals ; that the onset was acute and unilateral ; that there was usually massive papillomatous hypertrophy, with yellow nodules and swelling of the glands ; also, that the prognosis was remarkably good, although the disease might last for some considerable time. Wessely's case showed all these characteristics. The cornea was never implicated, the glands did not soften, and recovery, which occupied three months, was complete. As soon as the patient was taken into the *Klinik* a piece of diseased conjunctiva was excised for pathological investigation. The bacteriological examination of the secretion and of the excised portion was negative, both were sterile. Histological examination showed a homogeneous, small-celled infiltration, with some giant cells. There was occasional necrosis at the margins of the hypertrophic papillæ. The yellow nodules proved microscopically to be typical tubercles. The outer zone contained lymphocytes and plasma cells ; the inner zone epithelioid cells and many giant cells.

Hoor, Rupprecht, and others have described similar appearances in Parinaud's conjunctivitis. Neither Wessely nor any other investigator has ever discovered tubercle bacilli in these cases. Inoculation under the conjunctiva of a monkey produced an acute local tuberculous process of the lids and face, and, finally, death from generalised tuberculosis. Tubercle bacilli were demonstrated everywhere, although the lesions showed no typical microscopic picture.

Wessely has thus shown that a case which clinically was a typical Parinaud's conjunctivitis, was in reality a tuberculous process. The experiments proved that the process could not be inoculated upon cats and rabbits,

but easily upon monkeys. Wessely does not suggest that all cases of Parinaud's conjunctivitis are tuberculous. T. HARRISON BUTLER.

(12A) In a child of seventeen months, who was very ill and had recently developed hemiplegia, **Mathewson**, of Montreal, found the choroid to be studded with many tiny tubercles. At the *post-mortem* examination tuberculosis of meninges, pleuræ, peritoneum, and choroids.

SYDNEY STEPHENSON.

(13) **Axenfeld** and **Stock** direct attention to tuberculosis as a cause of recurring hæmorrhages in the vitreous in young patients. They describe ophthalmoscopic changes of the retinal vessels, especially veins, consisting of white lines along the vessels, or white bands obscuring the red column of blood from view. These changes may, and, as a rule, do, disappear without leaving a trace. They are due, if not to tubercle bacilli themselves, at least to their toxines, as evidenced by a general, and, more important still, a local reaction after a diagnostic injection of tuberculin. The same ætiology holds good for some cases of retinitis proliferans. The results of tuberculine treatment, however, have not been striking. C. MARKUS.

(14) **Jessop,** of London, exhibited in 1910 a patient who was known to be affected with tubercle of the choroid in 1903, in order to show the quiescent condition of the fundus changes after the lapse of seven years.

SYDNEY STEPHENSON.

(15) In the *Annales d'Oculistique* for August, 1908, **Lafon** published an article on epibulbar tuberculoma or tuberculous gumma of the bulbar conjunctiva.* He now records three cases in which similar lesions occurred on the palpebral conjunctiva, and after giving *résumés* of nine cases reported by other observers, discusses the condition. The lesions, which are probably of endogenous origin, consist of tumours, usually single, but sometimes divided into lobules by furrows. These vary in form with their situation, being flattened when over the tarsus and lenticular or pedunculated when in the superior *cul-de-sac*. Their size does not exceed that of a bean. In the early stages they are reddish and covered with epithelium, and their base is not infiltrated; but later the epithelium becomes destroyed, and the bare surface infected. Enlargement of the pre-auricular gland is a very important symptom, but is not present in every case. The histological appearances are those of tubercle. The diagnosis is easy when there is enlargement of the pre-auricular gland, but in other cases may require microscopic examination or inoculation experiments. The prognosis with regard to the local lesion is good, but regarded as evidence of a systemic tuberculous infection, the condition is a serious one. Treatment consists in excision of the tumour. Sutures or cauterisation is unnecessary. R. J. COULTER.

(16) A general discussion on the subject by **Windbiel,** of Amsterdam, N.Y., not suitable for abstracting.

(17) **Oreste** gives a full clinical and pathological description of a case of tuberculous sclero-keratitis treated in the Lariboisière. The patient was a woman, aged 36, who had suffered from lupus of the face and body for many years, and had always had bad sight, owing to leucomata and myopic astigmatism. Commencing in 1904, she developed in the left eye repeated attacks of scleritis, sometimes with and sometimes without involvement of the cornea. In January, 1908, there were small whitish interstitial nodules in parts of the cornea, the lower-outer fifth of which was occupied by whitish infiltration. The sclerotic had a violet colour, with increased injection opposite to the infiltrated corneal area. The vision was normal. The eye was irritable, watery, and blurred. In December, 1908, the eye was removed,

*Abstracted in THE OPHTHALMOSCOPE for 1909, p. 185.

as it was painful. Two guinea pigs were inoculated with pieces of tissue from the region of the anterior scleral lesions. One of these remained healthy, but the other developed caseous mesenteric glands, containing tubercle bacilli. The pathological examination of the excised eye showed that, apart from glaucomatous changes, the posterior half was normal. In the anterior half the angle of the anterior chamber was occluded and the posterior chamber was about four times its normal size. The iris and ciliary processes were practically normal, but the pupil was blocked by a fibrinous membrane which was adherent to the edge of the iris and to the anterior lens capsule. The central parts of the cornea were normal, but there was proliferation of the epithelium; but at its periphery, and in the anterior part of the sclera, there was thickening, due to intense leucocytic infiltration, with formation of new vessels, but without any typical tubercles or giant cells.

The author, after referring to an article by Chesneau on "A Form of Parenchymatous Keratitis probably Tuberculous" (*Ann. d'Oculistique*, T. CXXXIII, p. 412), and giving *résumés* of three cases reported by C. G. Wemmerslager van Sparwunde (*Thèse d'Amsterdam*, 1909), discusses the diagnosis of the condition from rheumatic or leprous scleritis, and gives reasons for considering that the source of infection is endogenous, and that the primary ocular localisation is in the sclerotic.

For treatment, tuberculin or subconjunctival injections of air are indicated.

R. J. COULTER.

VI.—AN UNDESCRIBED DISEASE OF THE CORNEA.

(1) **Fleischer, B.—Concerning a hitherto unknown disease associated with greenish corneal discolouration (general peculiar pigmentation of the body, tremor, liver cirrhosis, hypertrophy of the spleen, and diabetes).** [Ueber eine bisher nicht bekannte mit grunlicher Hornhautverfärbung einhergehende Krankheit (allgemeine eigenartige Pigmentierung des Körpers, Tremor, Lebercirrhose, Milzvergrösserung und Diabetes).] *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(2) **Fleischer, B.—On a peculiar, and hitherto unknown, opacity of the cornea [a hint towards the normal structure of the cornea].** (Ueber eine eigenartige bisher nicht bekannte Hornhauttrubung [ein Hinweis auf die normale Structur der Hornhaut].) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXVII, i Heft, 11 Oktober, 1910.

(1) **Fleischer** (Tübingen).—Many years ago three cases of a hitherto unknown discolouration of the cornea were observed in the Tübingen clinic. The first case was described by Kayser in 1902, the other two by Fleischer in 1903. The condition was characterised by a greenish-brown discolouration of the periphery of the cornea, localised in the layers of the cornea, which was seen by the corneal microscope to be composed of fine, irregular, greenish-brown specks. These were most numerous at the periphery, and gradually became invisible towards the centre. The visual acuity was unaltered, and no other changes were detected in the eye. Recently, Salus has described another case (1905) which came to the Prague clinic. All these four cases suffered from a serious nervous symptom, namely, severe tremor. Two of the patients have died, and autopsy has shown that the corneal discolouration is but part of a general, very peculiar, pigmentation of the whole body. This pigmentation is obviously the result of a severe disorder of tissue metabolism, which goes hand in

hand with disease of internal organs. It can further be demonstrated that the nervous symptoms which affected these four patients are not due to disseminated sclerosis, as was at first suggested.

The tremor is an intention tremor, and may be so severe that the patients can no longer walk nor can they eat unaided.

In Kayser's case there was considerable pigmentation of the skin and a peculiar form of diabetes.

The cases examined *post-mortem* were found to have hypertrophic cirrhosis of the liver, enlargement of the spleen, and a slight brown discolouration of almost all the internal organs. The pigment itself was not a blood derivative, for it was easily soluble in ammonium sulphide, and failed to dissolve in ether, alcohol, chloroform, acids, or alkalies. Nor was it a bile-pigment, for it was insoluble in alkalies and did not give the nitric acid reaction.

Fleischer draws a parallel with the bronzing seen in some cases of diabetes.

The paper is illustrated by two plates which show the pigment grains in different parts of the eye. T. HARRISON BUTLER.

(2) In a woman suffering from multiple sclerosis, **Fleischer**, of Tübingen, found a peculiar condition of the cornea, which, he thinks, has not yet been described. The change, which was practically identical in both eyes, did not materially interfere with vision in one, while the other was amblyopic from paralytic squint and optic atrophy. Under ordinary conditions the cornea showed a very slight filmy haze, but with strong power, the opacity was seen to consist of fine wavy lines, which converged vortex-like towards two points above and below the centre with a narrow horizontal band of clear tissue between them. The opacity seemed to belong to a superficial layer immediately below Bowman's membrane, and Fleischer suggests that its configuration may be due to the anatomical arrangement of the corneal fibres within these layers. R. GRUBER.

VII.—THE ÆTIOLOGY OF RETRO-BULBAR NEURITIS.

Dutoit, A.—On the ætiology of retro-bulbar neuritis. (Zur Aetiologie der Neuritis retro-bulbaris.) *Archiv für Augenheilkunde*, April, 1911.

Retrobulbar neuritis, secondary to disease of the nasal sinuses by direct extension through the orbit or optic canal, is now an established fact; but changes in the bone, of an inflammatory nature, may, of course, be independent of nasal disease. Circulatory changes in the form of hyperæmia and venous engorgement in the region of the optic nerve may thus be of osteogenic origin, and may cause sufficient compression of the optic nerve to cause damage to the sight.

Dutoit brings forward two cases to support the dental origin of retro-bulbar neuritis.

One case concerned none other than himself. He had periostitis of the upper jaw in the region of the second premolar tooth. Six days later, he found he had a central scotoma in the right eye, together with œdema of the upper lid on the same side. Nasal examination showed some hyperæmia and increased secretion from the mucous membrane, especially in the region of the right inferior turbinate bone. Treatment consisted of extraction of the tooth, scarification of the mucous membrane, and leeches to the back of the ear. The process, which was unilateral, cleared up in a few days. He considered the optic nerve to be interfered with through disturbance of the circulation, the dental veins communicating with the orbit through the pterygoid plexus, the œdema

of the upper lid on the same side being evidence of disturbance in the circulation.

The second case was that of a woman who was suffering from facial neuralgia, and who neglected proper medical advice until her sight began to fail for near work. Her visual acuity was found to have fallen to half the normal; she had a central scotoma with full peripheral field. There was definite hyperæmia of the optic disc and the retinal veins were engorged. Dental examination showed that her wisdom teeth had failed to erupt, and that the gums were swollen and œdematous. Nasal examination failed to reveal anything but hyperæmia and increased secretion in the region of the inferior turbinate bone.

Treatment consisted in removal of the teeth by opening up the alveolar margin. The teeth were found to be lying in granulation tissue, and the walls of the cavity were eroded. The cavities were scraped out, and in consequence there was considerable hæmorrhage. There was rapid improvement, the neuralgia and scotoma disappearing, but the hyperæmia of the disc lasted some time. In this case Dutoit holds that the non-erupted tooth led to increase in pressure in the alveolar cavity, compressed the pulp, and so interfered with its nutrition that the tooth died, and acting as a foreign body, set up periostitis. In consequence, circulatory changes occurred which led to orbital congestion, compression of the optic nerve, and so to damage of the papillo-macular bundle.

He holds that the prognosis will depend on the severity and duration of this engorgement, and that the date of onset of the neuralgia will greatly assist in computing this. Active treatment should be undertaken at once, so that permanent damage to the optic nerve may not result. Loss of blood in the course of the operation is a good thing, since it reduces the congestion.

Diagnosis is based on the dental finding, sinus disease and toxic amblyopia being excluded. R. BEATSON HIRD.

VIII.—EYE-STRAIN.

(1) **Risley, Samuel D.—Psychoses associated with ocular affections.** *Ophthalmic Record*, March, 1910.

(2) **Stephenson, Sydney.—The aftermath of eye-strain.** *Lancet*, December 17th, 1910.

(3) **Bowlan, Marcus.—Errors of refraction in their reflex and distant manifestations.** *Lancet*, December 31st, 1910.

(4) **Clarke, Ernest.—Neurasthenia and eye-strain.** *Practitioner*, January, 1911

(5) **Hinshelwood, James.—Eye strain in relation to the general health.** *Lancet*, February 18th, 1911.

(1) **Risley**, of Philadelphia, records some cases in which the usual asthenopic symptoms due to errors of refraction or ocular imbalance were associated with peculiar psychical disturbances.

CASE I.—In the first case, a married lady, aged 32 years, was insane, and suffered from more or less constant headache, aggravated or brought on by reading. Glasses correcting a low degree of hypermetropic astigmatism and diminished range of accommodation, relieved her asthenopia, removed the delusions, and enabled her to return to her home.

CASE II.—A scientist who had long suffered from headache and a tendency to diplopia, became distressed in mind, because he found it difficult to grasp the sense of what he was reading, and on many occasions had attacks of *petit mal* and hallucinations. Glasses for hypermetropic astigmatism (hitherto regarded as myopic astigmatism) and advancement of the internal rectus for exophoria resulted in gradual disappearance of asthenopic symptoms, *petit mal*, and hallucinations.

CASE III.—A sister of Case II. Symptoms very similar to those of her brother, but had flickering scotomata and no *petit mal*. Glasses correcting her hypermetropic astigmatism and hyperphoria, and prism exercises for exophoria, dispersed all the symptoms.

The mother of these two patients had slight hypermetropia and a hyperphoria of so high a degree that binocular vision was impossible, and she did not suffer from hallucinations or headache.

CASE IV.—A woman, aged 32 years, suffering from "nervous exhaustion," insomnia, headache, and a dread of the future. Glasses were ordered to correct a high hypermetropic astigmatism but they gave little relief until a hyperphoria of 4° had been corrected by operation (tenotomy). The relief after this was immediate, and the night after the operation she slept and rested as she had never done before.

In all these cases in addition to the ocular defects, either "the family or individual history pointed to some inherent instability, to some physiologic vice, congenital or acquired, which rendered the nervous or mental equipoise unstable and therefore readily upset." J. JAMESON EVANS.

(2) **Stephenson**, of London, in his Middlemore lecture, gives an impartial review of the facts for and against the validity of various near and remote symptoms of eye-strain.

The lecture is divided into portions—general and special. The former includes: how to recognise symptomatic eye-strain; the kind of patient; how eye-strain shows itself; the kind and magnitude of error; and the method of estimating the error.

We note with pleasure the author's repetition of the statement (not yet, we think, fully appreciated by oculists) that no eye can be pronounced normal until the refraction has been investigated under a cycloplegic, and then only when the investigator is a competent surgeon. The various factors in the production of eye-strain, on the side of the patient, and on the side of the ocular error itself, are well put forward. The method of estimating the error must take account of the fact that the amount of ametropia may be exceedingly small, and quite beyond recognition by any method which does not contemplate complete cycloplegia, and that even 0.12 D. of astigmatism may, on occasion, cause intense discomfort.

The "special" portion of the lecture takes up, more or less historically, and in some detail, the general and local symptoms which may result from eye-strain. We may here give some examples.—Although astigmatism was described more than a century ago by Thomas Young, it was not until 1874 that Weir Mitchell called particular attention to the headache of unsuspected eye-strain, while in 1877 Hughlings Jackson spoke of cases of abnormal refraction simulating brain disease through attacks of frontal headache and vomiting. Insomnia has been shown to be caused by astigmatism, by Hewetson, Snell, and Ranney. Migraine was recognised 75 years ago as associated with ocular defects by Piorry. As a matter of routine practice, the eyes should be examined in every case of sick headache. Vertigo as a consequence of eye-strain is undoubted. It occurs more often in women than in men.

Other effects of uncompensated eye-strain may be grouped as neuroses. One of these is habit-spasm occurring in sparse and nervous children from five to twelve years. It must not be confused with chorea. With reference to these cases the author says—(1) Such children seldom complain of eye-strain ; (2) their sight is usually good ; (3) no dependence whatever should be attached to an estimation of refraction unless the eyes at the moment of examination are fully under the influence of atropine ; (4) the ametropia should be corrected almost fully by glasses to be worn for every purpose.

R. W. Doyne has recently claimed that polyuria may be a manifestation of eye-strain. The question of the possible relation of epilepsy and eye-strain is a much debated one into which Stephenson enters and quotes authorities *pro* and *con*. He sums up as follows :—" I cannot help thinking that there is a case for further investigation into the relation between eye strain and epilepsy In any such investigation it is to be hoped that three precautions will be adopted : (1) to make sure that the disease is true epilepsy, and not a mere hysteroid convulsion ; (2) to treat the patient by glasses alone ; and (3) to observe the case, not for weeks, but for years."

After referring to George M. Gould's well-known *Biographic Clinics*, in which that author proves, to his own satisfaction, that the irritability, nervousness and general ill-health of some of the greatest writers and thinkers were due to undetected eye-strain, Stephenson himself records, from his own experience, as well as from the literature, cases in proof of the following statement, " It cannot indeed be doubted that in some neuropathic individuals (the class from whom great writers are mainly recruited) the eyes are accountable for a host of troubles, which range from nervous 'breakdowns,' mental apprehension, and agoraphobia, on the one hand, to the manifestations of neurasthenia or of actual mental disorder, on the other. At the same time such cases (which are far from common in my experience) occur only in nervous, highly strung individuals." For details of the cases, reference must be made to the original.

S. E.

(3) **Bowlan,** of London, in a letter to the Editor of the *Lancet*, with reference to Sydney Stephenson's Middlemore Lecture on " The Aftermath of Eye-Strain," recalls the case of a girl of eight years, who had been refused at school as an idiot. She was admitted to hospital as suffering from " mental hebetude," with a view to being sent to an idiot asylum. She had been attending a special school for weak-minded children, and had been found incapable of receiving instruction. Nevertheless, this child was really only suffering from compound hypermetropic astigmatism, and when her refraction error had been corrected, she could count fifth-inch dots at twenty feet. She received spectacles, and was sent home, instead of to an asylum.

ERNEST THOMSON.

(4) **Clarke,** of London, contributes to a special number of the *Practitioner* dealing with Neurasthenia, a short article upon the influence of eye-strain in the causation of that neurosis. The nerve waste induced by eye-strain, he thinks, " is one of the causes, if not the most potent cause, in the production of such conditions styled as neurasthenia, brain-fag, or nerve exhaustion." Indeed, one cannot be far wrong in asserting that any functional nerve disorder may be traced to eye-strain. Clarke lays stress upon the several facts : first, that the patient seldom suspects his eyes to be at fault ; secondly, that neurasthenia and eye-strain prevail during the same periods of life ; thirdly, that examinations of the eyes conducted without the aid of cycloplegics are valueless ; and, lastly, that where eye-strain exists, the smallest error of refraction must be corrected and the correction be worn for all purposes.

SYDNEY STEPHENSON.

(5) **Hinshelwood,** of Glasgow, is writing for the general practitioner, but in this paper there are several points which may well be noted by the specialist. Hinshelwood does not deal here with the local manifestations of eye-strain in the eye or its appendages. The symptoms discussed are outside of the local and obvious ones. Headache is, of course, one of the most important of these. In connection with this symptom, Hinshelwood draws attention to the fact that the origin of a headache is often complex. It may be partially ocular and partially toxic. Ocular headache is generally absent in the morning, comes on during the day, and progressively gets worse. Toxic headache is worst in the morning and becomes better when the patient gets up and exerts himself. When the two causes are combined the patient wakes with a headache which gets worse as the day goes on. Another frequent combination is that of anæmia with eye-strain. Insomnia, so-called "brain-fag," choreiform movements in children, and vertigo as the result of eye-strain, are discussed. With regard to the last-named, the author has seen two cases, not of the usual kind where there is paralysis or paresis of an ocular muscle, in which the vertigo was so severe that the patients were supposed to be suffering from disease of the nervous system. In all the cases of vertigo due to eye-strain which the author has seen the associated error has been hypermetropia or hypermetropic astigmatism. Dyspepsia resulting from eye-strain is touched upon. Many cases of dyspepsia, although relieved by drugs and dieting, will not be cured until the factor of eye-strain is completely eliminated. Hinshelwood has found that it is in the acid form of dyspepsia, more particularly, that eye-strain plays an important part. Cure of this form of dyspepsia can only be brought about by an improved tone of the nervous system, and in some cases the relief of the nervous exhaustion produced by eye-strain is the only possible way of effecting this and so of curing the patient ERNEST THOMSON.

IX.—AMBLYOPIA EX ANOPSIA.

(1) **Visser, R. P.—Congenital amblyopia.** (Congenitale amblyopie.) *Nederlandsch Tijdschrift voor Geneeskunde*, 1909, p. 292.

(2) **Phillips, W. L.—The treatment of congenital argamblyopia.** *Ophthalmology*, July, 1910.

(3) **Mathewson, Geo. H.—Amblyopia ex anopsia with acquisition of good vision.** *Montreal Medical Journal*, July, 1910.

(4) **Caillaud.—On so-called amblyopia ex anopsia.** (A propos des amblyopies dites ex anopsia.) *La Clinique Ophtalmologique*, 10 novembre, 1910.

(5) **Lagrange.—On strabismic amblyopia: its cause from want of use, its cure by exercise.** (De l'amblyopie strabique, sa cause dans le défaut d'usage, sa gúerison par l'exercise.) *Archives d'Ophtalmologie*, avril, 1911.

(1) **Visser** has taken the field of vision in a great number of patients with congenital amblyopia. To avoid the difficulty of bad fixation of the centrum, he made use of various binocular methods of perimetry, mostly of that in which a coloured glass is held before one eye and the field taken with a mark in the complementary colour. His investigations led

Visser to the conclusion that in almost every case of congenital amblyopia there exists a weakness of the vision all over the field, but in the central part a more or less clearly-defined scotoma exists. When the field is taken in the ordinary way, this central scotoma escapes observation. G. F. ROCHAT.

(2) **Phillips** records a number of cases in which, even after correction of an error of refraction, the vision of one eye remained very defective, but where treatment by appropriate exercise brought the vision of the defective eye up to normal. He divides the cases into two groups, the first of which have some power of recognising types at a distance, the others require the letters to be very close. In each case he adapts the treatment to the patient's capacity, proceeding systematically to extend the range within which the letters can be recognised. The exercises should be short, so as not to tire the patient. This treatment is, of course, supplemented by correction of the refractive error, the correction being revised from time to time as the vision improves.

A. J. BALLANTYNE.

(3) **Mathewson,** of Montreal, reports one of those curious cases where the sight of an eye almost lost from disease became good after injury to the other eye.—A boy, aged 13 years, had never seen well with his right eye. In consequence of an injury, it became necessary to remove the other (good) eye. When the lad left hospital a week after operation, the sight of his right eye was fingers at twelve feet improved to 6/36 with a plus 4.0 D. sph. lens. Even with the glass, he was unable to read very coarse print. In five weeks, his sight was 6/12 without the glass, while with the glass it was 6/9, and he could read the finest print with ease. SYDNEY STEPHENSON.

(4) **Caillaud,** from the study of twenty-five cases of anisometropia of various degrees, has evolved the axiom that the feebler the degree of anisometropia the greater the degree of amblyopia, or, in other words, the amblyopia tends to be in inverse ratio to the degree of anisometropia. Briefly put, the author's explanation of his observations is as follows—

If the difference of refraction between the two eyes is great, the image belonging to the more ametropic eye is so indistinct that a slight degree of amblyopia is enough to prevent it becoming a hindrance to vision. If, on the other hand, the difference of refraction is slight, the image belonging to the more ametropic eye is very embarrassing, and a high degree of amblyopia is required to render it absolutely indistinct.

We cannot help thinking that the author ought to have quoted his twenty-five cases in greater detail than he has done, in order to give others the opportunity to see how each case individually conforms to the rule which he has stated. In any event, the subject is interesting, and well worthy of further study. ERNEST THOMSON.

(5) From the study of some 600 cases of strabismus which have occurred at the Children's Hospital between 1894 and 1910, **Lagrange**, of Bordeaux, brings forward evidence in favour of the theory of "amblyopia ex anopsia." The notes of the cases have been made by different observers without any preconceived ideas as to existing theories, and are therefore of value in that they are free from bias in any direction.

With Onfray, the author admits the existence in rare cases of a congenital amblyopia pre-existent to the strabismus, but considers this condition to be the great exception and amblyopia ex anopsia the rule.

I.—*Cause of the strabismic amblyopia from want of use.*

For this section the cases are divided into three groups. (1) Cases of alternating and intermittent strabismus. (2) Cases of monolateral strabismus commencing during the first three years after birth. (3) Cases of strabismus beginning after three years.

In the first group in 29 cases, 26 times there was the same acuity in both eyes ; three times only was it a little less on one side, but in a degree insignificant when the duration of the alternating strabismus was taken into account. These figures agree with those of Berlin, who in 225 cases of alternating strabismus found amblyopia and a slight amblyopia only twice.

In the second group the prominent feature is the degree of amblyopia in the deviated eye. After the most perfect optical correction, this was found to lie between $\frac{1}{200}$ and $\frac{1}{10}$. It is explained by the fact that the eye deviated before it acquired its full physiological functions. The variations in the degree of the amblyopia in different cases is explained by the great individual differences in the time taken by the visual apparatus to acquire its development.

The third group comprises the most important cases in support of the theory, for they show that the visual acuity is diminished exactly according to the age of the squint.—When the squint existed for a year, the acuity was between normal and $\frac{1}{2}$; when it existed for two years it varied between $\frac{1}{2}$ and $\frac{1}{3}$; when four years old between $\frac{1}{3}$ and $\frac{1}{5}$; for five or six years between $\frac{1}{2}$ and $\frac{1}{7}$; for seven or ten years between $\frac{1}{7}$ and $\frac{1}{10}$; and for ten years or more between $\frac{1}{10}$ and $\frac{1}{20}$. Mention is made of the various objections raised to the theory by certain authors, and explanations are given. Thus, the formation of a false macula is held to explain the objection that in some old strabismic cases the deviated eye is not amblyopic. To the statement that there is no amblyopia in paralytic strabismus, it is urged that amblyopia does occur, although it takes a long time to develop—more quickly, however, when the deviation is very marked ; whilst if no amblyopia occurs and the false image is very troublesome, it signifies that the eye is functional, and has then no reason to become amblyopic.

II.—*Improvement of the strabismic amblyopia by exercise.*

Quoting the statistics worked out by his pupils, Cosse, Ginestous, and Moreau, the author finds as follows.—In 15 cases by Cosse there was an average improvement in the visual acuity of ·35 ; in 14 by Ginestous the acuity before exercise varied between $\frac{1}{25}$ and $\frac{1}{5}$, and after exercise between $\frac{1}{10}$ and $\frac{1}{2}$. In 25 cases by Moreau, acuity, which before exercise varied between $\frac{1}{100}$ and $\frac{1}{3}$, was improved to between $\frac{1}{50}$ and unity.

In conclusion, Lagrange says that if amblyopia pre-dated the strabismus, and could not be improved by exercise, it would form a formidable obstacle to the cure of the strabismus. BERNARD CRIDLAND.

X.—SCHOOL CHILDREN'S EYES.

(1) **Carhart, W. M.—Hygiene of the eye in school children.** *American Journal of Obstetrics*, Vol. LVIII, No. 1, 1908.

(2) **Trotsenburg, J. van.—Anomalies of the refraction and trachoma in school children in Dutch West-India.** (Refractie-anomaliën en trachoom bij West-Indische schoolkinderen.) *Ned. Tijdschrift voor Geneeskunde*, 1908, I, No. 16.

(3) **Pollock, W. B. Inglis.—The visual acuity of school children.** *British Medical Journal*, 2nd October, 1909, p. 980.

(4) **Terlinck, H. — The prophylaxis of school myopia.** *La Clinique* (Brussels), 20 mars, 1909.

(5) **Harman, N. Bishop.—The systematic examination of the eyes of school children.** *Clinical Journal*, 8th December, 1909.

(6) **Beatson Hird, R.—Ophthalmic school clinics in the country.** *British Medical Journal*, 29th October, 1910.

(7) **Harman, W. Bishop.—The education of high myopes.** *Brit. Med. Journal*, 29th October, 1910.

(8) **Dorrell, E. Arthur. — Refraction of the eye in school children.** *Brit. Med. Journal*, 13th August, 1910.

(1) This is a paper which apparently is intended for the general practitioner. It is on the usual lines, and need scarcely be abstracted for the readers of THE OPHTHALMOSCOPE. ERNEST THOMSON.

In Dutch West-India (Suriname, Curaçoa), children at school are much less over-burdened than they usually are in European schools. One would think that under such favourable conditions myopia would occur less frequently. After an examination of 1,500 school children, **Trotsenburg** found that the frequency of myopia was not less than in Holland. He also could observe the well-known fact that in school children myopia is most frequent in the older children, and more frequent among children of the better situated classes than among the poorest classes. In the isle of Curaçoa, among 177 children of 14-18 years, twenty-one per cent. were astigmatic. This high percentage of astigmatism probably is due to the fact that descendants of a few families always marry amongst themselves, whereby a hereditary condition, as astigmatism, can soon become very frequent.

Trachoma in Dutch West-India is very frequent. Attention may be called to the observation that trachoma is very often seen in negroes, who by some are regarded as comparatively immune to that disease. G. F. ROCHAT.

(3) After quoting statistics to show the great variation published in school annual reports of the results of the medical inspection of the visual acuity of the scholars, **Pollock,** of Glasgow, referred to his own results, which gave 11·65 per cent. of defective vision. The London County Council Schools gave 10·39 per cent. among 1,196,504 children, as the result of the teachers' examination. The author showed that the latter percentage was lower because both eyes were kept open, while his own was the result obtained from the better eye of the child. He strongly condemned the method of taking the vision of the child's worse eye as the vision of the child.

Variations were also due to different standards of normal and defective vision adopted. He had followed Dr. Kerr's method, that 6/18 or less was defect, and advised both eyes to be tested separately, although classifying by the better eye. He also brought forward evidence against the curious theory that the normal vision of the child is not equal to that of the adult. The tests must be suitable to the intelligence and knowledge of the pupils.

(4) **Terlinck's** article is a summary and analysis of the various methods of attacking school myopia from the prophylactic standpoint. An astounding amount of work has been done in this direction, and only a feeble result has been obtained, from the prevention of marriage between myopes, the correction of astigmatism, the treatment of corneal opacities, the full correction of myopia, the increase of the size of print, the supervision of the handwriting and the attitude adopted thereat, and from the systematic improvement of illumination and of writing desks.

But there are highly instructive exceptions. Thus, in the higher grade school of Djmsholm, there were in 1904 only 4 per cent. of myopes, and only in one scholar did it amount to more than 1 D. (1.25 D.). In the same way, in the whole of Sweden the percentage of myopes has considerably diminished

in twenty years. This result, so vainly sought elsewhere, has been reached there because of a direct attack upon the enemy—the book. Latin and Greek have been greatly cut down and open-air exercise has been encouraged.

From these facts Terlinck concludes that all the previously enumerated prophylactic measures are mere accessories, and that what is wanted is reform of the *programme* and of the *methods*. Masters and parents should know that near work cannot be unduly prolonged without danger, and should recognize that wisdom can be acquired otherwise than by the studying of books.

ERNEST THOMSON.

(5) This interesting lecture to the Society of Medical Officers of Health, by **Harman,** of London, does not demand abstraction in this Journal.

ERNEST THOMSON.

(6) **Beatson Hird**, of Birmingham, describes the village school clinics which he supervises in the district of North Worcestershire, round Broomsgrove. The examination was carried out in the usual school buildings on Saturday mornings, and this arrangement proved satisfactory.

The percentages of errors found were: hypermetropic, 29·75 per cent., myopic, 7·25 per cent. Bishop Harman found 29 per cent. of myopia. These figures tend to show that myopia is commoner in towns that in the country. The subject is of importance, for at the present moment the British Medical Association has sent round a circular, No. 25, outlining a most unsatisfactory scheme for dealing with defective school children, so that all evidence dealing with school clinics is of the greatest value. T. HARRISON BUTLER.

(7) The paper by **Harman**, of London, deals with the best methods of educating myopes. The author's desk for short-sighted pupils is illustrated. It is a clever and artistic piece of furniture, well adapted to its purpose.

T. HARRISON BUTLER.

(8) This article by **Dorrell,** of London, represents an address to a general medical audience, and hardly calls for detailed abstraction here. At the same time one feels that seldom are the rules for the performance of retinoscopy (the author prefers the plane mirror) and the prescription of glasses so succinctly set out in general terms as in this article.

ERNEST THOMSON.

XI.—CHOKED DISC.

(1) **Schieck**, F. — **Experimental studies upon the genesis of choked disc.** (**Experimentelle Studien zur Genese der Stauungspapille.**) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(2) **Paton, Leslie, and Holmes, Gordon.—The pathology of papillœdema.** *Brain*, Vol. XXXIII, Part CXXXII, 1911.

(3) **Mamourian, Marcus, and Smith, Charles Johnson.—The mechanical etiology of optic neuritis.** *British Medical Journal*, April 8th, 1911.

(4) **Henderson, Thomson.—The pathology of papillœdema.** *Lancet*, September 16th, 1911.

(1) **Schieck**, of Göttingen, has always maintained that choked disc is a purely mechanical œdema, and that any inflammatory signs are merely secondary manifestations. In this paper he publishes an account of a *post-mortem* examination which corroborates other examinations he has made,

and the results of which he has published. The central chink in the axial fibres of the optic nerve has been said to be an artefact due to formol hardening. In this case special pains were taken by using Müller's solution to avoid such shrinking. Nevertheless, the sections clearly showed its presence. Experiments on the dead eye showed that chrome-yellow gelatine could be injected into the intervaginal sheath and made to penetrate through the hilus of the nerve along the retinal vessels. In one case Schieck succeeded in obliterating the physiological cup.

Experiments showed that choked disc could not be caused in monkeys by placing tents in the skull, even although the intracranial pressure rose sufficiently to kill the animal. Injection of paraffin did not cause choked disc, but when normal saline was injected under pressure, choked disc developed. The author concludes that mere rise of pressure within the skull cannot cause a choked disc—there must be an increased secretion of the liquor cerebro-spinalis. Schieck also found that the injection of the fluid on one side of the skull produced a greater choking of the disc on that side than on the other.

T. HARRISON BUTLER.

(2) **Paton** and **Holmes**, of London, have had exceptional opportunities of investigating this subject in the National Hospital for the Paralysed and Epileptic, Queen Square, W.C., and have examined clinically and pathologically sixty eyes from cases of papillœdema.

The result of their findings is, that they advance a new view as to the causation of the condition. They consider that papillœdema is purely an œdema of the nerve-head, not an inflammatory change, that is to say.

The mechanism of the œdema is somewhat as follows.—Intracranial increased pressure is communicated to the vaginal sheath of the optic nerves. In the sheath the retinal vein passes for some distance before entering the nerve, and it is in this part of its course that the increased pressure gives rise to its effects. The vein, when in the nerve itself, is more or less protected from the pressure, and can and does become distended, and communicates its increased pressure back to the nerve-head where it is most evident in its results. Along with the vein, the lymph channels are pressed upon, and this aids in the causation of stasis and effusion.

The authors show (by sections) that the central vein is distended at the nerve-head (not in the lamina cribrosa where it is protected), and in its intra-neural portion, but that, whilst in the sheath, the nerve is empty. It is explained that the nerve, although in the sheath and subjected equally with other structures to the increased pressure, protects the vein from the said increased pressure. How it can do so from a mechanical point of view, it is a little difficult to see, so long as the pressure on the nerve is equal all round. The writers, however, further state that the vein, whilst leaving the nerve, passes round it still in the pial sheath (page 399). Even here, they say, the vein is generally distended, although when it passes through the pial sheath it is collapsed. This is tantamount to saying that the pial sheath alone is sufficient to protect the vein from the increased pressure.

Now, it is just beyond the dural sheath that the vein has its communication with the orbital veins, and we would like to be sure that this does not explain the collapse of the vein in its intravaginal passage. If this part of the paper were more clear, we should have less difficulty in accepting unreservedly the views advanced.

There is one point made by the writers of the paper which deserves note—namely, that on page 428 where they call attention to the fact (already noted) that papillœdema may be absent on one side if the tumour which causes increase of intracranial pressure is near and obstructs the free interchange of

fluids at the optic foramen. This is certainly a point difficult to explain in the light of any other theory.

The writers in the course of the paper explain the mode of origin of the cytoid bodies found in the retina and nerve-head, and also the origin of the macular fan, in accordance with Gunn's view.

The paper is illustrated by many excellent photomicrographs, some of which, we venture to think, in spite of the view of the authors, show evidence of cell infiltration distinctly in excess of the normal, and we should have been pleased to see photographs of sections from normal tissues for comparison. Especially we may mention Figs. 7, 8, and 9 in this regard.

LESLIE BUCHANAN.

(3) **Mamourian** and **Smith** (Ashton-under-Lyne) commence their article by giving a summary (Mott's) of the views which have been held on the causation of optic neuritis, namely, to put them shortly, the inflammation view, the venous obstruction view, and the intracranial pressure view. Clinical evidence tends to show that the toxic or inflammation theories are untenable. "The fact that papillœdema is rare in post-basal meningitis . . . . and its predominance in non-inflammatory conditions, such as tumour, chlorotic and other non-infective sinus thrombosis, and cerebral aneurism, constitute an uncontestable negation to such hypotheses."

The authors hold, with Horsley and Swanzy, that increased intracranial pressure is the principal mechanical agent in the production of papillœdema, and that the chief factor in the production of such increase has not yet been definitely ascertained. Most clinicians have viewed this question from a purely pathological standpoint, but a correct solution of the problem of obtaining an interpretation applicable to all cases of increased intracranial pressure with optic neuritis must be based upon physiological findings.

It has been conclusively established that the cerebro-spinal fluid is secreted by the choroid plexuses of the ventricles, and that the channels of its resorption are the superior cerebral veins which join the superior longitudinal sinus. Each vein of the subarachnoid space is surrounded by a sheath, and between this sheath and the vein there is cerebro-spinal fluid. Thus, these veins are chiefly concerned with the withdrawal of fluid from the subarachnoid space. Observations made by the authors lead them to the view that interference with the cerebral venous return is the predominant factor in producing increased intracranial pressure, and that papillœdema is due to the resulting rise of fluid pressure in the optic nerve sheath. They hold that in every case of optic neuritis there is obliteration or obstruction of the veins, or they are rendered impervious by disease of the lymphatic sheaths. "Thus our view," they say, "is diametrically opposed to that of Thomson Henderson, whose deductions are based upon the assumption that the intracranial pressure represents the venous pressure (Hill) in all pathological conditions, and who asserts that whenever there is increased intracranial there is increased venous pressure."

The authors then proceed to show how the recognised pathological conditions which give rise to optic neuritis, namely (*a*) Vascular, (*b*) Organismal; syphilis, meningitis, and (*c*) Neoplasmic lesions are compatible with their views, which are expressed as follows:—

"Papillœdema results from the lessened or arrested absorption of fluid from the subarachnoid space, in consequence of:

(*a*) Obliteration of the patency of the superior cerebral veins.
(*b*) Disorganization of the perivascular lymphatic sheaths.
(*c*) Occlusion of one or more of the venous sinuses."

We may, perhaps, very briefly summarise what they say.—As regards

vascular lesions, the explanation of the papillœdema from thrombosis of the sup. long. sinus is self-evident. The main channel for the discharge of surplus cerebro-spinal fluid is occluded. As regards *organismal* lesions, in syphilis endolymphangitis is responsible for the impairment of the absorptive functions of the superior cerebral veins. In extensive basic meningitis without optic neuritis, it is assumed that the lymphatic sheaths are not involved.

As regards *Neoplasmic* lesions, abscesses included.—Tumours in the cerebrum compress the brain tissue and ultimately the veins. The tumour must be of some size before it can press upon the veins. "Optic neuritis is not so common a sequel of abscess in the temporo-sphenoidal lobe as it is of abscess in the cerebellar region, for the simple reason that a much larger accumulation of pus or more extensive accompanying meningitis is needed for its production in the cerebral than in the cerebellar area. On the toxic or inflammatory theory, however, optic neuritis should be equally common in both varieties." Finally, the extreme frequency of optic neuritis in tumours and abscesses of the cerebellum (89%) and of the corpora quadrigemina (100%), with consequent closure of the iter followed by internal hydrocephalus, points to the probability of the production of collapse of the delicate veins of the brain substance by this considerable internal hydraulic pressure. ERNEST THOMSON.

XII.—ANÆSTHESIA, LOCAL AND GENERAL.

(1) **Béal.—Microphthalmos.—Rapid death after an operation under chloroform anæsthesia.** (**Microphtalmie.—Mort rapide après intervention sous l'anésthésie chloroformique.**) *Ann. d'Oculistique*, mars, 1911.

(2) **Brunetière. — Notes on the technique of local anæsthesia in enucleation.** (**Notes sur la technique de l'anesthésie locale dans l'énucléation.**) *La Clinique Ophtalmologique*, 10 juillet, 1911.

(1) **Béal**, of Paris, records the death of a child with microphthalmic eyes 15 hours after an iridectomy under chloroform. The time between the commencement and the end of the administration of the anæsthetic was four minutes, and the amount of chloroform used was 4 cm., part of which evaporated on the mask. The unfavourable symptoms commenced seven hours after the operation. The breath never smelled of chloroform, there was no delirium, the urine was abundant and clear, and there was no icterus; but there were some slight convulsive movements and the child vomited some glairy, blood-stained material. The author calls attention to the number of cases of death from chloroform poisoning after an interval, in which there has been some congenital abnormality present, and suggests that in such patients some other anæsthetic should be used. R. J. COULTER.

(2) **Brunetière,** of Bordeaux, following the practice of others, notably Siegrist and Haab, has tried enucleation under local anæsthesia in six selected cases. He believes that the method is quite a success in uncomplicated cases in adults who are not specially nervous. It is, of couse, unsuitable in acute cases.

The solution which Brunetière employs by preference is that of Haab. The following is the formula :—

Hydrochloride of cocaine ...	0·15 grm.
Eucaine	0·20 grm.
Adrenaline 1 to 1000	5 drops
Water	10 grms.

The maximum total dose which the author considers safe is 1·5 cc. of this solution. The surface of the globe first having been thoroughly anæsthetised in the ordinary manner, a subconjunctival injection of 1/4 cc. of the solution above-named is made along each rectus muscle. After an interval of eight or ten minutes as a minimum, the muscles are divided in the usual way, and when the globe has been liberated, the remaining half cubic centimetre of the solution is injected at the posterior pole. After another wait of five minutes, the optic nerve is divided, with one cut if possible. The patient is kept on his back for several hours and is given strong coffee with a little alcohol.

It is to be noted that the period of the operation at which pain is most likely to be complained of, is when a squint hook is passed under the tendons. This pain may largely be avoided by picking them up with a forceps, after the manner of Jocqs. The patients have all said that the pain was quite bearable. They were more perturbed by the thought of being conscious of what was taking place than by the actual pain. ERNEST THOMSON.

XIII.—REMEDIES.

(1) Brav, Aaron.—Post-operative intraocular hæmorrhage resulting in total blindness and destruction of the eyeball. *American Medicine*, May, 1907.

(2) McCubbin, J. B.—Some eye affections and Salvarsan. *American Journal of Ophthalmology*, July, 1911.

(3) Wicherkiewicz, P.—The treatment of parenchymatous keratitis by Salvarsan. (Les kératites parenchymateuses traitées par le Salvarsan.) *La Clinique Ophtalmologique*, 10 juillet, 1911.

(4) Trantas.—Paralysis of the common oculo-motor after injection of "606." (Paralysie de l'oculo-moteur commun après l'injection de "606.") *La Clinique Ophtalmologique*, 10 juillet, 1911.

(5) Arens.—Further investigations on the action of Pyocyanase on the cause of ulcus serpens. (Weitere Untersuchungen ueber die Wirkung der Pyocyanase auf den Erreger des Ulcus serpens.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 27 Juli, 1911.

(1) **Brav**, of Philadelphia, believes that the most rational procedure in these cases is to make a hypodermic injection of morphia immediately before the operation. He says "that it should be used whenever an intraocular hæmorrhage is anticipated." He is sure, however, that while the injection is of very little value after hæmorrhage has occurred, it has a prophylactic value in preventing hæmorrhage, by allaying excitement and reducing shock to a minimum. "The patient," he tells us, "falls asleep after the operation for several hours, and a hæmorrhage may thus be avoided."

(3) The article of **Wicherkiewicz**, of Cracow, on the treatment of hereditary specific interstitial keratitis by "Salvarsan" is the outcome of a series of clinical observations scientifically carried out and recorded with much care. In these respects it is in sharp contrast with the type of article often met with when a new remedy is being "boomed." The record concerns only eleven

cases, but these are so fully gone into that one cannot do justice to them in an abstract. We give the author's conclusions :—

1. Salvarsan, although it is an excellent remedy in various syphilitic affections of the eye, has not so much effect in parenchymatous keratitis as in other conditions.

2. All the same, its action in this disease cannot be denied, and is specially marked in severe vascular keratitis, in which condition it overcomes the photophobia and blepharospasm, so that the injection of the conjunctiva, and even that of the cornea, very quickly diminishes.

3. In cases of avascular keratitis, clearing of the cornea very quickly commences after the application of Salvarsan, but such clearing only shows itself at the extreme periphery of the cornea.

4. Intravenous and intramuscular applications are the most efficacious, but subcutaneous application, especially in a glycerine solution, is harmless.

5. The use of Salvarsan should be begun early, and ought to be accompanied by appropriate treatment, such as hot compresses, atropine, massage, tonic treatment, and, if need be, mercury and iodide.

The following sentence also seems to express the author's point of view very clearly :—" Apart, then, from the very remarkable effect of Salvarsan in cutting short a severe inflammatory condition, I am in agreement with those of my colleagues who are not enchanted with Salvarsan in the treatment of congenital syphilitic interstitial keratitis, while at the same time I do not deny to it any effect. The truth lies midway. . . ." ERNEST THOMSON.

(4) **Trantas**, of Constantinople, relates the very interesting case of a man of 18 years who was treated for primary syphilis by injection of 0·45 centigrm. of "606," who and developed a total ophthalmoplegia of the left eye eight weeks later. Was the ophthalmoplegia due to the syphilis or to the drug ? The author does not consider it possible at the present time to give a categorical reply to this question, although one would be disposed to attribute the paralysis to the syphilis. Yet, as the author rather wisely remarks, the possible *rôle* of "606" in the matter is so much in evidence that one dare not give another injection, as one would do if thoroughly convinced that it had nothing to do with the case. A number of facts seem to favour the view that the drug was to blame. Some of these are as follow.—(1) Oculomotor paralysis is very rare in the early months of syphilis ; (2) Stern found only three cases of ocular muscle paralysis in 5,000 cases of syphilis, while, on the other hand, he found three cases in 200 syphilitics treated with "606." Finger had two cases of ocular muscle paralysis in 170 syphilitics treated by "606." (3) In all the recorded cases the paralysis came on between two and three months after the injection of "606."

The case is recorded as a contribution to the growing number of facts on the subject of the new treatment of syphilis. ERNEST THOMSON.

(5) **Arens**, of Würzburg, has employed pyocyanase in a further series of forty-one cases of ulcer of the cornea, in addition to the seventeen cases reported two years ago (*see* THE OPHTHALMOSCOPE, Volume VIII, p. 147). The pyocyanase is dropped into the eye every half hour, and is accompanied by atropine and hot applications. He again reports the most favourable results of this method of treatment, drawing particular attention to the rapid disappearance of the hypopyon. A post-operative infection with a shallow hypopyon, following prolapse of the vitreous, recovered with a good result. In a case of ring abscess of the cornea the cautery was used, as it was thought the pyocyanase could not penetrate intact epithelium. This failed to arrest the process ; but after thorough opening up of the abscess with the

sharp spoon, pyocyanase was applied, and recovery commenced with complete absorption of the hypopyon.

The author also reports a number of experiments with pyocyanase and the pneumococcus obtained from mouse septicæmia. Blood containing the pneumococcus was mixed with ½ ccm. and tests were taken at minute intervals from 1 to 10. After four minutes there was a very considerable reduction in the colonies obtained; while after six minutes action of the pyocyanase, pneumococci could not be cultivated. Controls were carried out. The bacteriology of the ulcer cases is not given. W. B. INGLIS POLLOCK.

BOOK NOTICES.

Tuberculosis of the Lacrymal Passages. (Tuberculose des Voies Lacrymales.) By Professor ROLLET, of Lyons, France. Paris: G. Steinheil, 2, Rue Casimir-Delavigne. 1911.

This *brochure* of upwards of one hundred pages represents Professor Rollet's contribution to the discussion upon tuberculosis of the lacrymal passages held by the French Ophthalmological Society at its meeting in May last. It is based upon the clinical and experimental study of nineteen personal cases, and is a complete exposition of the subject, with many references to literature.

Tubercle of the lacrymal passages, of course, is characterised by infective changes due to the Koch bacillus. Several affections now recognised as tuberculous were described by older writers under various denominations, but it was reserved for modern times to classify them in accordance with their ætiology. It is, in fact, only since the work of Haab and his pupils that we have recognised that lacrymal tuberculosis, primary and secondary, is not uncommon clinically.

Lacrymal tuberculosis appears under the influence of various causes, of which some are predisposing and the others determining. Heredity, stigmata of latent tuberculosis, as "scrofula," or active surgical tuberculosis, as adenitis, lupus, or osteo-arthritis, are common in those affected. Predisposing factors are to be found in the female sex (74 per cent. of the cases) and in early adult life (average 19 years; average of ordinary dacryocystitis, 37 years). Primary lacrymal tuberculosis evolves without lesions of contiguous parts, and may be met with in healthy subjects, in the "strumous," and, more rarely, in the phthisical. It is due to exogenous infection. Secondary lacrymal tuberculosis, on the contrary, succeeds a primitive focus of disease in the nasal cavities (which should always be looked for), a cutaneous lupus, and comparatively seldom a conjunctival or osseous lesion. It is due to an endogenous infection.

The author recognises four chief forms of lacrymal tuberculosis, as follows:—

1. The fungating lacrymal tumour—the so-called "lacrymal white swelling"—*i.e.*, a doughy, non-reducible prominence of the lacrymal sac, not associated with the escape of pus upon pressure. The overlying skin shows no changes. This is a non-suppurating and closed form of tuberculosis.

2. A simple escape of tears, due to hyper-secretion at the beginning or to obstruction by tiny fungating growths of the lacrymal sac or nasal canal.

3. Lacrymal suppuration—chronic dacryocystitis—without at first ectasia of the sac. This may be followed by a lacrymal tumour.

4. Tuberculosis of the neighbouring structures, affecting especially the presaccular connective tissue. Tuberculous fistula of the sac and ostitis are included in this class.

The microscopical appearances include follicular lesions, situated particularly in the sub-mucous adenoid layer. The subcutaneous tissues may be invaded by epithelioid and giant cells. Sclerosis of the lacrymal sac is common. The specific micro-organism is rarely to be found in the lacrymal fungosities.

Rollet insists upon the complete curability of the lesions. It must not be forgotten, moreover, as he points out, that a "scrofulous" subject has undergone a relative vaccination, and seldom develops visceral complications.

The clinical diagnosis is often simple enough, and may be made by the association of signs, such as the age and sex of the patient, the family history of tubercle, the possibility of infection, and the associated stigmata. The softness of the fungous swelling, and the enlargement of the neighbouring glands, together with the chronicity of the affection, attract attention, to say nothing of a fistula, caseous clots, and violaceous skin, should such be present. By these means it becomes possible to exclude pure inflammatory lesions, syphilis, and sporotrichosis. Laboratory methods may be usefully employed in diagnosis, more particularly as histological examination is in itself inadequate, since nodular formations and giant cells are not peculiar to tuberculosis, and side by side with a specific follicular tuberculosis there may exist an inflammatory or non-follicular tuberculosis. Other plans that may be adopted include the finding of the Koch bacilli in the lacrymal pus and especially in pus from the enlarged glands (Poulard), the subcutaneous inoculation of the guinea-pig, the use of tuberculin, and the agglutinating sero-reaction.

Apart from tuberculin-therapy (still on its trial in these affections), it may be said that the treatment of lacrymal tuberculosis is essentially surgical and local. *Lavage* has its indications in early cases, although cure is seldom reached by that means. Probes may be employed in certain non-fungating forms of disease, but Rollet does not recommend them very strongly. Neither does he wax enthusiastic over opening the diseased sac, and treating its contents with the curette or the thermo-cautery or with such agents as lactic acid, gold chloride, bismuth paste, or xeroform. The best treatment, in his opinion, is to extirpate the affected sac. When dealing with diffuse fungous lesions, the sac must be destroyed with the thermo-cautery or removed piecemeal. SYDNEY STEPHENSON.

The Colour and Moral Sense. By GEORGE HENRY TAYLOR, Railway Medical Officer, New South Wales.

This is an attempt by the author to associate the moral sense with the colour sense. He states that the appreciation of music in the colour-blind appears to diminish as the colour sense diminishes. Speaking for myself, I have found exactly the opposite. I find more colour-blind persons amongst musicians than any other class. This indeed we should expect, the auditory centres being developed in one case, the visual centres in the other. He also states that a colour-blind person's face is devoid of warmth or humour; it is dull, still, and monotonous in the sameness of its expression. I totally disagree with this, and it certainly is not so in England. Colour-blindness is very frequently associated with exceptional intelligence and ability, and this fact has been generally overlooked by those who have constructed tests. In many cases a colour-blind person passes by reading the examiner. I could give instances of colour-blind men who are the acknowledged heads of their

particular professions; some of the most eloquent, persuasive, and humorous orators are colour-blind.

Dr. Taylor's *brochure*, by the way, bears neither date nor publisher's name.

F. W. EDRIDGE-GREEN.

Pathology and Bacteriology. By E. TREACHER COLLINS and M. STEPHEN MAYOU. With three coloured plates and two hundred and thirty-seven figures in the text. Philadelphia, Pa., U.S.A.: P. Blakiston's Son and Co., 1012, Walnut Street. 1911. Price $4.00.

One obstacle to the study of ocular pathology and bacteriology in this country has hitherto been the absence of any book dealing comprehensively with the subjects and yet of such a size as not to appear rather formidable to the busy clinical practitioner.

This omission has now been supplied by a volume in the series of books known as "An International System of Ophthalmic Practice," edited by Dr. Walter L. Pyle, of Philadelphia, and published by P. Blakiston's Son and Company, of the same city.

The volume in question is by E. Treacher Collins and M. Stephen Mayou, who have given us a book of less than six hundred pages, liberally illustrated, and embodying not so much the researches of other authors as an account of the work they have themselves accomplished, either individually or collectively. The result is a monograph the existence of which can be overlooked by no ophthalmic sugeon—not a treatise, let alone a many-volumed tome, but a book that stands alone in the English language. It will undoubtedly give a fillip to the study of ocular pathology in England and America. We welcome its publication, and are persuaded that our readers will do likewise.

Anything like a mere pathological description of the diseases of the eye, according to this or that anatomical structure involved, has been eschewed by the authors. They have grouped affairs upon a more logical plan, not the least merit of a very meritorious book. They divide, in short, a disease into the several processes that occur in its life-history, thereby avoiding the overlapping inseparable from the other plan.

The book is divided into seven chapters, the first of which deals with aberrations that may occur in the evolution of the eye. This is followed by an account of the atavisms of the various tissues, or "teleplasms," as the authors prefer to term the resulting new formations. Chapter III is devoted to the description of derangements in the circulation of the fluids whereby the nutrition of the eye is maintained. Glaucoma is naturally included in this section. The three following chapters (IV, V, and VI) are devoted to discussing the disturbances that may result from an untoward environment, such as injuries, inflammation, and parasitic affections. Chapter VII and last deals with the processes of involution or degeneration as they involve the various tissues of the eye.

In an appendix the authors have given an account of the practical methods adopted in hardening, cutting, and staining objects for the microscope. The preparation of vaccines, the Wassermann re-action, and agglutination tests have not escaped attention.

For the purpose of giving readers some idea of the scientific method followed in Collins and Mayou's book, we can perhaps scarcely do better than indicate the plan which has been followed in dealing with developmental aberrations. The section opens with some remarks of a general character, in the course of which the authors point out that while most developmental aberrations are congenital, all congenital defects are not of necessity aberrations in development. The influence of intra-uterine inflammation, amniotic

adhesions, and of injuries at birth must not be lost sight of. Aberrations themselves are described under five heads.—1. Those connected with the formation of the primary and secondary optic vesicles; 2. Those connected with the invaginating surface epiblast; 3. Those connected with the invaginating mesoblast; 4. Those connected with the encircling mesoblast; and 5. Those connected with the structures in the line of the orbito-nasal fissure and the formation of the eyelids.

Pathology and Bacteriology is so free from printers' blunders that it may be worth while to point out the few that have been noted by the reviewer in the course of his reading with a view to their correction in a second edition. They are as follows:—"Is" for "are" (p. 428, line 8). "Pannus vasculous" for "pannus vasculosus" (p. 429). "*Archiv. d'Ophth.*" for "*Arch. d'Ophtal.*" (p. 26 and p. 135). "*Munich. medizin. Wochensch.*" for "*Münch. medizin. Wochensch.*" (p. 95, foot note). On p. 128 the words "elastica lamina" are of course transposed. On p. 176 "milliary" should be "miliary" (fifth line), and "differs" should be "differ" (thirteenth line). The lettering is absent from Figure III. On p. 200 "Uhthoff" figures as "Uhthoft," while on p. 428 and elsewhere "Stellwag" is printed with one l. On p. 325 "choroiditis" is printed "chroiditis," and on p. 194 (foot note) "Socs." stands for the abbreviation "Soc." "Iridodonesis" is spelled "Iridodenesis" on p. 244. "Neissler" on p. 533 should read "Neisser." Finally, Zenker's fluid contains as one of its ingredients not potassium bicarbonate, as stated on p. 518, but potassium bichromate. SYDNEY STEPHENSON.

Refraction of the Eye. By ERNEST CLARKE. Third Edition. London: Baillière, Tindall, & Cox. 1911. Price 5s. net.

We have read with interest this, the third edition of Ernest Clarke's popular work, the full title of which is *The Errors of Accommodation and Refraction of the Eye, and their Treatment.* It is based on lectures delivered to graduates and undergraduates, and is a sincere attempt to bring within the compass of a handy volume all that a student or practitioner should know to enable him to deal with errors of refraction and muscular anomalies of the eye.

The least satisfactory portions of the book are to be found in the earlier chapters, devoted to Refraction, Lenses, Prisms, etc. Here we meet the familiar difficulty of compressing into reasonable bulk a sufficient account of the scientific principles on which refraction work is based. In places brevity has been attained only at the sacrifice of intelligibility.

The author has been much more successful in the chapters dealing with the diagnosis, estimation, and treatment of errors of refraction, some parts of which could scarcely be improved upon. The views expressed in these chapters are, on the whole, orthodox, and need not be discussed, but one or two points may be briefly referred to. The subject of Accommodation is illustrated by means of Donders' charts, but in the chapter on Presbyopia a table of Duane's latest figures is given, and also the results of the author's investigation of over 600 cases, which correspond closely with Duane's.

We think Mr. Clarke is unwise in his choice of the terms "direct" and "inverse" astigmatism in preference to astigmatism "with the rule" and "against the rule," and there is no reason why the term "oblique" should be confined to astigmatism whose axes are exactly 45° and 135°. But after all, these names are useful only as colloquial expressions. It is more important that the student should be taught the meaning of the terms "major axis"

and "minor axis" in astigmatism, and how they are applicable in ophthalmometry, retinoscopy, direct ophthalmoscopy, and the use of trial lenses. The author does not seem to employ these terms, but they would have been useful. For example, on page 119, where, in speaking of astigmatism in general, he says, "The axis of the correcting cylinder will be in the same direction as that of the meridian of 'least refraction,'" the absurdity of which statement is at once shown by his own example of the two methods of correcting a mixed astigmatism.

The chapter on eyestrain, as might be expected, is good. The author emphasises the great variety of troubles which may be traceable to errors of refraction, and all will agree with his conclusion that the prevention of eyestrain will play a very prominent part in the preventive medicine of the future.

Heterophoria is pretty fully dealt with, and squint as fully as one would expect in a non-surgical text-book. He refers to operative treatment in passing, and apparently advocates in the first place tenotomy, then advancement, and tenotomy in the other eye if necessary. He speaks of the danger that a convergent squint that has been corrected may develop into a divergent one. We doubt if this ever occurs after a simple advancement.

Brief chapters are devoted to the subjects of cycloplegics, methodical examination, apparatus, note taking, and the fitting of spectacles. A useful feature of the book is the chapter of illustrative cases, which might have been still more useful if the cases had been referred to as occasion arose in the course of the earlier chapters. The last section gives the standards of vision for the Army, Navy, and other services.

The style of the book is excellent, and the illustrations, on the whole, are good. A very full index is given.

We have noted some half-dozen printer's errors, only one of which, however, obscures the author's meaning. A. J. BALLANTYNE.

A Pocket Atlas and Text-Book of the Fundus Oculi. By G. LINDSAY JOHNSON, with drawings from life by ARTHUR W. HEAD, F.Z.S. London: Adlard & Son, Bartholomew Close. 1911. Price 10s. 6d. net.

Johnson and Head's "*Pocket Atlas and Text-Book of the Fundus Oculi*" is in the form of a neat green pocket book with tuck-in flap and inside pocket, and is accompanied by a drawing book for the use of the student. This drawing book contains instructions how to employ the red and black pencil (supplied) in such a way that an "ophthalmic artist" can interpret and reproduce the picture in a finished manner, suitable for publication.

The atlas is made up of 53 well executed coloured figures of the fundus, each accompanied by a short description. These figures are, for the most part, representative of familiar fundus conditions.

The atlas and drawing book together form only about one-half the thickness of the whole book. The text-book and its index occupy 205 pages. This text-book portion contains eight chapters and an appendix. All the chapters, the first excepted, deal with the normal and morbid anatomy of the eye, and the corresponding ophthalmoscopic pictures, in a concise and intelligible manner which leaves little to be desired from the standpoint of the "practitioner and medical student" to whom the work is addressed. Yet the author is surely somewhat sanguine when he says in his preface that "the retina and choroid are fully dealt with, both as regards their minute anatomy and functions, as well as their congenital abnormalities." As an example in

justification of this little criticism we would point out that the not so very uncommon, and to the beginner extremely puzzling, appearance of "chorio-vaginal veins" is not mentioned at all.

With Chapter I (66 pages), which is headed "The Ophthalmoscope," and deals with theories of the direct and indirect methods, the estimation of refraction by the ophthalmoscope, retinoscopy, and other things, we have no hesitation in saying that we are not pleased. It gives one the impression of being either too short or too long. Whereas the remainder of the book is eminently readable, even if somewhat loose in style here and there, this particular chapter seems to require remodelling.

The proof-reader has not been quite alert in one or two places (notably on pages 15, 16, and 131), and the author has made an ambiguous assertion about the *meridian of greatest refraction* on page 64. But the sum total of errors is not great.

The book is certain to be of service to many, to a greater number perhaps than those to whom it is directly addressed. When a second edition is called for, some judicious pruning applied, as we think, more especially to the first chapter, would make this "pocket-book" even more readily adaptable to the pocket—in the matter of thickness—than it is at present. We wish the volume all success. ERNEST THOMSON.

NOTES AND ECHOES.

Deaths.

WE regret to announce the death of Dr. P. Chibret, of Clermond-Ferrand, a noted ophthalmic surgeon, and the founder of the French Ophthalmological Society.

Mr. H. R. Dew, a Crimean veteran and consulting surgeon to the Bristol Eye Hospital, died at Stanton Drew, near Bristol, on September 6th, last. One of his ancestors was offered a peerage for saving the life of Charles I, and he declined the honour for the quaint reason 'that he was of such high standing in the county, and so well off.'

The death is anounced of Dr. Rava, professor of ophthalmology in the Sassari Medical School.

* * * *

Appointments.

Mr. A. Levy has been appointed assistant surgeon to the Central London Ophthalmic Hospital.

Mr. T. E. Ashdown Carr has been appointed resident assistant surgeon to the Cheltenham Eye, Ear, and Throat Hospital.

Privat-dozent Dr. Moritz Sachs has been nominated extraordinary professor of ophthalmology in the University of Vienna.

Dr. Liutkevich has been appointed professor of ophthalmology in Dorpat.

Dr. Victor F. Reis has been recognized as *privat-dozent* of ophthalmology in Lemberg.

Dr. R. Pignatari has been recognized as *privat-dozent* of ophthalmology in Parma.

* * * *

American Ophthalmological Society.

THE following office-bearers have been appointed for the ensuing session:

President: Dr. Edward Jackson, of Denver, Colorada.

Vice-President: Dr. Myles Standish, of Boston.

Secretary-Treasurer: Dr. W. M. Sweet, of Philadelphia.

Corresponding Secretary: Dr. Arnold Knapp, of New York City.

* * * *

St. Andrews University.

AMONG the recipients of the honorary degree of D.C.L., recently conferred in connection with the celebration of the five-hundreth anniversary of the University of St. Andrews, we note the name of Dr. George A. Berry, president of the Royal College of Surgeons of Edinburgh.

* * * *

American Optometry.

OPPOSITION to optometry is growing as expected, for these men are advertising themselves for what they are not. Some are not even opticians. The schools which they have created, falsely state that the students are properly instructed in one or two months, often only three lessons a week, in such matters as anatomy and physiology of the eye, diseases of the eye, materia medica and optics, each one of which requires years. The whole thing is ridiculous, and some governors are wisely vetoing the bills in the interests of public health. The laws, legalizing this form of quackery or incompetence, should be revoked at once, but such a desirable bit of common sense cannot be expected until the legislators are shown concrete cases of damage done by ignoramuses. These will be reported in time, of course, as the optometrists gain self-confidence and treat cases they now refer to learned physicians who have spent years specializing, yet it is horrible to think the damage cannot be prevented and that we must wait for it to be done. It is like waiting until a mad dog kills someone before we shoot it. As the laws must be revoked in time, it is hoped that the cases will promptly appear to avoid more. The American Medical Association has taken up the matter in the *Bulletin* of November 15th, 1910, which should be made available for all legislators, with the hope of influencing them to do the right thing before the damage is done.—*American Medicine*, August, 1911.

* * * *

Sight Tests in the Mercantile Marine.

ACCORDING to the report on sight tests used in the Mercantile marine last year (Cd. 5876), the total number of candidates examined was 7,502; of these 7,393 candidates passed in form vision and 109 failed. In the colour vision tests, 7,252 candidates were successful and 141 failed; of the latter 69 were re-examined on appeal, of whom 29 passed and 40 failed. No case of failure to pass the colour ignorance test has been reported. The number of officers already in possession of certificates who, on coming up for examination in 1910, failed to pass the sight tests, was twenty.

The whole question of the sight tests is now being considered by a Departmental Committee appointed for the purpose.

* * * *

Dr. J. W. Barrett.

CONGRATULATIONS to our distinguished correspondent, Dr. James W. Barrett, upon whom has been conferred the order of C.M.G.

* * * *

Mr. E. C. Fischer.

THE KING has been pleased to give and grant to Mr. Ernest C. Fischer, professor of ophthalmology at the School of Medicine, Cairo, his Majesty's Royal license and authority to accept and to wear the Insignia of the Third Class of the Imperial Ottoman Order of the Medjidieh, conferred upon him by his Highness the Khedive of Egypt, authorised by his Imperial Majesty the Sultan of Turkey, in recognition of valuable services rendered by him.

* * * *

Professor Uhthoff.

UPON Professor Uhthoff has been conferred the Prussian Order of the Red Eagle, Third Class, with clasp.

* * * *

The Oxford Diploma in Ophthalmology.

Messrs. R. J. COULTER and E. C. TEMPLE-SMITH were approved at the last examination for the Diploma in Ophthalmology held under the auspices of the University of Oxford.

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THE
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ORIGINAL COMMUNICATIONS.

ON OCULAR PALSIES OCCURRING AS THE SOLE OR MOST CONSPICUOUS OBJECTIVE EVIDENCE OF DISEASE.

BY

C. O. HAWTHORNE, M.D.GLASG.,

FELLOW OF THE ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW; PHYSICIAN TO THE CENTRAL LONDON OPHTHALMIC HOSPITAL.

THERE are symptoms and evidences of disease, not a few, to which sufferers will submit, even for long periods, without putting themselves to the trouble of taking medical advice. But among these, ocular paralyses will hardly find a place. Even the most careless or callous of patients is inconvenienced, or even alarmed, by the onset of the diplopia which such paralyses generally produce. Hence, for the most part, cases of ocular paralysis come promptly under medical observation, and, as they are not very infrequent events, abundant opportunities exist for studying their clinical associations and developments. Yet the study is not without difficulties. And perhaps the chief of these resides in the fact that in the majority of cases the ocular paralysis is seen as an isolated event; it has, in short, no clinical associations. On the other hand, it is perfectly well known that in not a few instances an ocular paralysis is merely the first of a series of events dependent on progressive and serious disease of the central nervous system. Hence comes the question in any individual case, marked, and marked only, by an ocular paralysis, is this a condition purely localized and without general significance, or is it the herald of widespread degenerative nervous disease? If a short and certain method of finding in every case a confident and ready answer to this question could be devised, the difficulties and anxieties which attend diagnosis and prognosis in cases of ocular paralysis would almost entirely disappear. But there is no such short and certain method. Probability there may be, but not certainty, or at least certainty only arrives when, through the lapse of time, it is seen that the paralysis was a mere isolated event in the patient's clinical history, or that, on the contrary, it was the forerunner of even more serious mischiefs.

The first claim which the above general statement enforces is that every case of ocular paralysis is a case of nervous disease, and is not, as the patient suffering from diplopia is apt to think, a mere localized affection of the eyes. An ocular paralysis demands just as searching and careful a scrutiny of the whole of the nervous system, and indeed of the other systems also, as does a case of hemiplegia, or of muscular atrophy, or of wristdrop. No one in these instances would be content with a mere nominal diagnosis and with a hurried prescription of potassium iodide; and an ocular paralysis merits at least equal respect. If this is granted, and if by competent investigation the absence of all clinical irregularities other than an ocular paralysis is established, the question above defined at once emerges, and an attempt has to be made to estimate the gravity or otherwise of the position. It has therefore to be asked whether an ocular paralysis can ever be "simple," in the sense of being non-indicative of serious organic nervous disease. Probably most experienced observers would answer this question in the affirmative, though actual demonstration in any individual case is, in the nature of things, impossible. All the same, there are good clinical arguments to support the thesis.

First in this association is the experience that other peripheral nerves, and notoriously the facial nerve, are at times damaged by some influence which

seems to exert merely a local action, and which, for want of a better name, is usually termed "rheumatism" or "cold"; further, though it is possible that this damage may prove to be permanent, it is often quite temporary, the nerve and the muscles it supplies completely recovering their functions. And, manifestly, if this is true of the seventh cranial nerve, it may well be true of the third, or fourth, or sixth. Again, there can be no question that patients do have ocular paralyses, and sometimes two or more attacks, followed by a partial or complete recovery, and yet live for many years, and without the development of any other evidence of an abnormal condition of the nervous system. And, once more, an ocular paralysis and a facial paralysis, though it must be admitted very occasionally, have been known to occur at the same time—to develop together, and to improve together; while hardly less significant is the fact that one and the same patient may have a history which includes, as separate records, both an ocular paralysis and a facial neuritis.

In view of all these facts, therefore, it seems necessary to admit that an ocular paralysis may be merely "simple" or "rheumatic." The difficulty is to be sure that this is the explanation in any individual case. All that can be said, perhaps, in the way of help in this difficulty is, that if the absence of syphilis can be guaranteed, if there are no other signs of nervous disease, and if the patient is more or less definitely "rheumatic" (whatever this may mean), it is a reasonable conclusion for practical purposes that the paralysis is of the simple order. Not that this necessarily means that it is to be of brief duration, or that a complete cure is certain. On the contrary, the damaged nerve, more or less extensively, may be permanently injured, and even when complete restoration is secured this may be a matter of weeks or even of months. It is all the more important to remember this, seeing that some of the ocular paralyses associated with central organic disease are but slight in degree and transitory in duration. In other words, it does not follow that because a paralysis is decided and prolonged it is necessarily the forerunner of further symptoms, nor does slightness of paralysis and brevity of duration inevitably indicate that anxiety for the future of the nervous system is wholly gratuitous.

One other remark in reference to these "simple" or "rheumatic" paralyses may be added. It is that for the most part such paralyses are confined either to a single nerve or to a single branch, or possibly neighbouring branches, of one and the same nerve. The rule is not absolute, but it has a fairly commanding range. Conspicuous exceptions are seen in three cases described by Sir Wm. Gowers[1]. In each of these all the nerves of the orbit were involved, and in two there was a previous history of a facial palsy. Ocular paralyses, then, and even severe and persistent ocular paralyses, may, in individual cases, and these probably not very infrequently, be merely the expression of a localised neuritis of the corresponding cranial nerves due to exposure, under conditions which cannot be exactly defined, to the prejudicial action of cold or chill.

The conclusion above presented may, further, find support in certain other clinical experiences—experiences, too, which are far from unimportant in themselves. The reference here is to cases of ocular paralysis occurring in pathological conditions in which a peripheral neuritis is either probable or certain. Take, for example, the case of diphtheria. Among the paralytic phenomena associated with this disease paralysis of the ciliary muscle is by no means infrequent, and paralysis of the sphincter iridis is well recognised. A general statement is that the external muscles of the eyeball are rarely attacked. But most unquestionably they are attacked sometimes, and perhaps more frequently than is commonly admitted.[2] Equally, an ocular paralysis

may make its appearance in a case of diabetes mellitus,[3] or of diabetes insipidus.[4] The same thing may be said of the clinical history of chronic alcoholism. And of every one of these conditions a peripheral neuritis is a more or less frequent associate. Of every one also, though perhaps not frequently, a diplopia due to an ocular paralysis may be, at least to the patient, the commanding event. From all this there may be urged two propositions:—first, that the occurrence of ocular paralysis in diseased conditions well known to produce a peripheral neuritis, adds force to the contention that a neuritis, probably due to cold, may be responsible for other cases of paralysis where none of the diseased conditions just alluded to is present; and, secondly, that the very variety of the circumstances in which ocular paralyses occur enforces the demand that these events claim in every instance thoroughness and completeness in the clinical investigation.

It may now perhaps be asked whether ocular paralyses are ever hysterical or functional in nature. The answer must certainly be either "never" or "well, hardly ever." For the most part, the existence of an ocular paralysis is sufficient to justify the conclusion that, even if the case includes an element of hysteria, it is not all hysteria. Still, there are occasional records which seem to show that perchance this rule also is not without its exceptions, rare though they be.[5] The safe clinical plan, however, is certainly to adhere to the rule, remembering, of course, that hysterical spasm of the orbicularis palpebrarum may simulate a paralytic ptosis, and that the more immediate ocular muscles may themselves occasionally, in similar circumstances, share in the spasm. In this connection mention may be made of myasthenia as a recognised though uncommon cause of ocular paresis. It is just possible to mistake such a condition for hysteria, as the paralysis varies much at different times, coming on with exhaustion and disappearing after rest. The symptoms here are bilateral and may include paralysis of the levator palpebræ superioris and of the orbicularis palpebrarum, as well as of the muscles directly attached to the eyeball. There are also other evidences of the disease, such, for example, as early exhaustion of muscular energy in walking, chewing, swallowing, etc.

Another association of ocular paralysis, apart from serious or progressive disease of the central nervous system, is with hemicrania. A certain number of sufferers from migraine have with each of their attacks an ocular paralysis and a consequent diplopia. These symptoms may recur again and again over many years, while between the attacks the patient enjoys good health. It seems necessary, therefore, here to speak of functional ocular paralysis, however unsatisfactory that term may be. But in some cases of recurring headache and diplopia the existence of organic disease has been demonstrated. It may be either central or peripheral. As an example of the former may be quoted a case described by Sir Wm. Gowers[6], in which, periodical headaches and diplopia were proved to be associated with a tuberculous focus at the root of the third nerve. There are other instances, too, in which a patient suffering from tuberculous disease of the lung or other part has developed an ocular paresis as the result of the development of tuberculous nodules in the brain. As an example of a peripheral nerve lesion responsible, apparently, both for hemicrania and a recurring ocular paralysis, may be mentioned some cases to which attention was drawn a few years ago by Dr. James Taylor[7]. In these, the symptoms of headache and diplopia occurred at intervals, the patients having good health between the attacks. After a time, however, the ocular paralysis did not recover, but remained as a permanent condition; and in some cases the presence of a tumour in the trunk of the third nerve was demonstrated. The suggestion is that so long as the growth was small it only blocked the nerve current when the nerve was congested during an attack

of migraine ; gradually, the growth of the tumour produced a greater degree of interference with the structure and functions of the nerve, and in this way a permanent paralysis was produced. Such experiences carry the obvious lesson that periodical headache and recurring diplopia must not lead hurriedly to the conclusion that the case is merely one of functional disturbance ; and this lesson is emphasized by an experience in which these symptoms were found to be due to an intracranial aneurism exercising pressure on the trunk of the third nerve within the skull[8].

Thus, to sum up this division of the subject, it may be said that "simple" ocular paralysis as the result of "cold" or "rheumatism" is a fairly well established condition ; that neuritis of the ocular nerves occasionally occurs in diabetes and other diseases in which peripheral nerve changes are well recognised ; that hysterical ocular paralysis is doubtful or more than doubtful ; and that myasthenia and migraine (conditions of uncertain organic significance) may, each in its own fashion, lead to ocular muscular defects.

Local disease in the orbit is obviously a possible cause of ocular paralyses, but on this aspect of the subject it is not necessary to insist, as the object of this paper is to review the general and remote, rather than the immediate and local, causes of such paralyses. One of the most common of these local causes is a syphilitic periostitis, and in some instances the precise localisation of this is indicated by anæsthesia in the distribution of the superior division of the fifth nerve, the existence of such anæsthesia in association with an ocular paralysis plainly pointing to the presence of a lesion in the neighbourhood of the sphenoidal fissure[9].

Of much more importance from the present point of view is the relation between ocular paralysis and the chronic degenerative nervous diseases. And chief in this regard is tabes dorsalis. It is not only the fact that such paralyses may accompany the other symptoms of the disease which makes this association of interest. Importance is rather to be attached to the lesson, taught by many records, that an ocular paralysis may be the first, and for some time the only evidence of those central degenerative changes in the nervous system which, in their complete expansion, produce the clinical picture of tabes dorsalis or locomotor ataxia[10]. Indeed, it is not too much to say that an ocular paralysis existing apart from any other abnormal clinical fact, and without manifest or certain explanation, ought to give rise to a suspicion of commencing tabes dorsalis. More especially is this true if the patient has reached the middle term of life and admits a history of syphilitic infection. Nor is the suspicion weakened by the fact that the paralysis is comparatively slight and is of relatively brief duration. Indeed, as already remarked, these two features are not uncommon in paralyses which, as subsequent events show, carry, in relation to the nervous system as a whole, a bad prognostic significance. More than all others, it is these cases of uncomplicated ocular paralysis occurring in middle life which raise the question of the true meaning of the paralysis—"simple" or "rheumatic," on the one hand, "specific" or "tabetic," on the other. As already remarked, the degree of severity and duration of the paralysis afford little or no help ; the extreme cases are quite as often found in the rheumatic as in the tabetic group, perhaps, indeed, more often. A bilateral distribution certainly favours the more serious diagnosis ; bilateral ptosis, for example, in tabes dorsalis is well known. But in the great majority of cases in which, as subsequent history shows, an ocular paralysis means early tabes dorsalis, the paralysis is strictly unilateral. Hence, while a bilateral distribution opposes strongly a "rheumatic" explanation, a unilateral paresis is consistent with either hypothesis. If, and indeed this is often the case, the doubt cannot

be resolved by other means, the quest should be pursued by examination of the cerebro-spinal fluid and by the Wassermann test. Either or both of these may yield facts sufficient to incline the balance in one or other direction, and the issue, it will be remembered, is no mere academic one; on the contrary, it has the closest possible bearing alike on prognosis and on treatment. Again, what is said here of tabes dorsalis is almost equally applicable to its near relation—general paralysis of the insane. And what is true of tabes dorsalis in adults in relation to ocular paralyses is also true of the juvenile form of the disease, as occasionally seen in the victims of congenital syphilis. Here again the paralysis may be the most obtrusive if not the sole evidence of central degenerative nervous change.[11]

Another nervous disease of which an ocular paralysis may be the first symptom, is disseminated sclerosis, and here, too, the paresis may be temporary in duration and may occur on one or more occasions. Syringomyelia, also, may include an ocular paralysis among its symptoms, but as a late rather than as an early event. Of even more interest is the occasional association of such a paralysis with chronic bulbar disease. Considering that the ophthalmic nuclei and the bulbar nuclei are members of one and same morphological series, and that they are also immediate anatomical neighbours, it is somewhat surprising that they are not more frequently involved together in a common pathological misfortune. Yet it is not so. An ophthalmoplegia, even though due to nuclear disease, is seldom the starting point of a bulbar paralysis, and in chronic degeneration of the bulbar nuclei there is rarely extension upwards to the nuclei of the grey matter of the Sylvian aqueduct. The following record, however, shows that at least the former of these two propositions has its exceptions.—A man of 47 years complained of double vision of six months duration, and was found to have paresis of the left third and sixth nerves, and also of the right sixth nerve. The involvement of several nerves and the bilateral distribution of the paralysis made, of course, the suggestion of a "rheumatic" causation extremely unlikely. Yet the patient denied all other symptoms, and a general examination produced negative results, with one exception, namely, a quite undoubted weakness of the muscles of mastication. Manifestly, in the circumstances, this fact was of sinister significance, and in the course of a few months the patient developed the general picture of a bulbar paralysis. The ocular paralysis here was merely the first clinical evidence of a degenerative process, which, commencing in the nuclei at the level of the iter, spread downwards to the nuclei of the pons and medulla.

Reference has already been made to syphilis as a cause of ocular paralysis, both immediately, as from a periostitis of the orbit, and less directly, in the clinical manifestations of tabes dorsalis and general paralysis of the insane. But these by no means exhaust the methods by which this disease may produce disturbance of the ocular movements. Degeneration of the nerve nuclei and gummatous developments involving the nerve trunks are equally well known and in these again the resulting paralyses may be the only objective evidences of the disease, at least until the Wassermann test or the examination of the cerebro-spinal fluid is practised. It is not unimportant to note that, however caused, the ocular paralysis due to syphilis may show a very limited distribution. Several authorities have held that the Argyll Robertson pupil may exist as the sole evidence of syphilis, and a definite specific paralysis may show a similar restriction. A case[14] has been recorded, in which, dilatation and immobility of the pupil on each side, as a sequel of syphilis, remained without further extension of paralytic phenomena, although the patient was kept under observation for a period of three years.

In gross intracranial lesions, as tumour, basal meningitis, hæmorrhage, etc., ocular palsies not infrequently occur, but here, for the most part, there are other and equally conspicuous symptoms. Occasionally, however, what is manifestly an acute cerebral attack displays paralytic phenomena limited to the ocular muscles. Of this a good illustration is afforded by a case reported by Simeon Snell[12]. The patient, a man of 50 years, while taking his evening meal, became unconscious, and the next day developed diplopia as a result of paralysis of the upward movement of each eyeball; after some weeks, the symptoms had completely disappeared. It seems impossible to question the occurrence of some sudden intracranial vascular lesion, and it is noteworthy that this could be sufficiently severe to produce unconsciousness and yet so limited as to yield paralytic phenomena confined to an extremely restricted area. Lastly, among intracranial lesions capable of producing ocular palsies may be mentioned the acute affection known as polio-encephalitis superior. In most of these cases there are several or many evidences of severe cerebral disturbance, but recently Sydney Stephenson[13] has described an oculo-motor type of the disease in which the only symptom is the acute development of a paralytic squint.

The general tendency of the foregoing remarks has been to emphasise the perplexities and anxieties to which ocular paralyses give rise. It may perhaps be well to mention two conditions in which the development of such paralyses is less threatening than would at first sight appear probable. The first of these is chlorosis. Rarely, but quite beyond question, a chlorotic girl develops double vision dependent on a paralysis of the sixth cranial nerve. Generally, perhaps invariably, such a patient shows, also, a double optic neuritis. Such a combination necessarily suggests in the highest degree some serious intracranial disease, and when, as is not uncommon in chlorotic girls, there is headache, and perhaps, also, from an accompanying gastric disorder, vomiting, there may well be an inclination to take a serious view of the position, and perhaps also a proposal to proceed to heroic measures. Exactly how chlorosis leads to optic neuritis and an ocular paresis is a difficult question to answer. One suggestion is that both of these events depend on thrombosis in some of the intracranial veins and sinuses.[15] The important point, clinically, is to appreciate the fact that even so terrifying a combination as an ocular paralysis with double optic neuritis does not *necessarily* mean serious intracranial disease and a correspondingly anxious prognosis. In an anæmic girl, treatment by rest, and the administration of iron, may very soon dispel even symptoms which carry so threatening a front. The second condition in which an ocular paralysis may have a less serious significance than its existence would at first suggest, is suppurative disease of the middle ear. Here, again, an ocular paralysis may be accompanied by double optic neuritis. And the addition of an ocular paralysis and double optic neuritis to an existing otitis media may well seem to demand the diagnosis of some serious intracranial complication calling for a prompt opening of the skull. There are cases in which such a conclusion has been justified, and the symptoms now under consideration have disappeared after, for example, the evacuation of an extra-dural abscess.[16] But it is equally certain that both an ocular paralysis and a double optic neuritis may exist in connection with suppurative disease of the middle ear entirely apart from any intracranial suppuration or other complication demanding exploration of the skull.[17] At one time the ocular paralysis in such cases was "explained" as a reflex result of stimulation of the vestibular nerve by the suppuration proceeding within the tympanic cavity. More recently Stoddart Barr[18] has described the explanation advanced by Gradenigo, of Turin. This, briefly, is that in certain temporal

bones the system of cells, or air-filled spaces, usually confined to the mastoid process and the neighbourhood of the antrum, may be widely extended and may affect the petrous bone even to its very apex. As the sixth nerve in its course along the base of the skull passes close to the tip of the petrous bone, any inflammatory condition affecting the latter may possibly involve the neighbouring nerve. Thus, given suppuration in the middle ear, and given a temporal bone of this "pneumatic" type, the sixth nerve may be sufficiently deranged to cause an ocular paralysis without any of the serious intracranial conditions which are recognised dangers in cases of otitis media. The point here, however, is not how the fact is to be explained, but a recognition of the possibility of an ocular paralysis failing to mean intracranial disease, in any practical sense of that term, in circumstances (suppurative disease of the middle ear) in which intracranial disease is more or less probable. Chlorosis and otitis media, each, at least at first sight, seems far removed from the formula of ocular paralysis as the sole objective evidence of disease. Yet in the clinical history of each there may appear an ocular paralysis which, in the circumstances, may, unless the possibility is appreciated, readily mislead both prognosis and treatment. It is, therefore, not inappropriate to the present discussion that allusion should be made both to chlorosis and to otitis media as conditions in which, as in the other conditions mentioned in this communication, the occurrence of an ocular paralysis is an event the significance of which by no means invariably lies on the surface.

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THE PRESENT POSITION OF THE QUESTION REGARDING "TRACHOMA BODIES."*

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About four years have passed since peculiar discoveries were made concerning trachoma first by Halberstädter and v. Prowazek in Java, and soon

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after by me and my fellow workers in Germany. v. Halberstädter and v. Prowazek called the newly discovered bodies *Chlamydozoa* (mantle animals), I at first called them "diplo-granules" (*Doppelkörnchen*), on account of their tendency to lie side by side; later on, wishing to choose an indifferent and non-committal name, I called them "trachoma bodies" (*Trachomkörperchen*). It is unnecessary for me to describe these bodies to you, since you are all fully acquainted with them. It is, however, perhaps seasonable at the present time, when some years have past, and the discoveries have been confirmed and enlarged on all sides, to take a survey and to look back, and also, I hope, to look forward, and to undertake a criticism founded upon further experience.

You will see that although there appears to be a lull in the literature, much work is being done by us and others in this branch, and our knowledge is decidely increasing.

I.—The first question which arises is *whether the bodies are accurately morphologically differentiated* in such a manner that they can be universally and surely distinguished from other appearances. In my opinion, we must in many respects even to-day answer this question in the negative. It is true that it is an easy matter to detect the corpuscles in their well-known cap form in the epithelium, especially now that Lindner's differentiating method has widened our scope for research in such a satisfactory manner. But at the present time the examination cannot be confined to mere form. The difficulties at once became great when we try to investigate the initial form of the focus, or when we attempt to detect it outside the ephithelium. Although the corpuscles are widely spread all through the tissues, between the cells, and in the lymphocytes, it is very difficult even now to find characteristic forms and to decide definitely that they are trachoma bodies and not other structures.

One can assert with certainty that those structures, which up to the present have been described as "chlamydozoa" or "trachoma bodies," are not all of similar nature.

In the next place, I thoroughly agree with Junius that not everything which is figured in papers as epithelium with trachoma bodies is in reality even epithelium.

At the International Congress at Budapest in the Autumn of 1909, Heymann pointed out that structures in the epithelium were continually being described as "Prowazek's bodies" or "trachoma corpuscles" which were not always so. He suggested, for example, that Herzog's discoveries were really something else.

Flemming in his work distinguishes in literature four different types, of which he, with reason, accepts only types II and III as positively determined.

In the work by Junius much is illustrated which certainly belongs to this group; much which with equal certainty does not so belong; and, thirdly, there is much upon which I am unable to decide with any approach to certainty.

There is no question that the simple typical cap form is easy to detect and to separate from other structures; but as soon as we pass to initial forms, even the most experienced is faced with preparations or drawings and descriptions which make him question whether it is not something else, without being able to give a direct "Yes" or "No." I maintain that we to-day are cognizant of a few typical appearances, which, however, no one in our province can circumscribe with concise scientific boundaries.

A scientific discussion as to what concerns the question and what does not,

must fail for want of evidence. We must hope for a further improvement in the *technique* of microscopical staining, and for a more accurate differentiation from other corpuscles, before we can effect a really strict separation.

II.—The second question, which we must discuss is: *Where and in what diseases have trachoma bodies been discovered?*

They have been found in a large number of cases of trachoma by Halberstädter and v. Prowazek and by me and my fellow workers. We have not been able to detect them in simple conjunctival catarrh. We have seen them in an early stage in a normal conjunctiva. This preparation is figured by Henford in the *Klin. Monatsblätter*, März, 1901, Bd. XLVII, 1909, Tafel iii, and by Clausen in the *Klinischen Jahrbuch*, 1908, Bd. XIX. We do not attach any value to this discovery, which has not been repeated, for we scarcely know what is normal in the conjunctiva. We cannot confirm the statement of Antonelli, junr. (*Archives für Augenheilkunde*, Bd. LVII) that the structures are very frequently found in the normal conjunctiva of man and apes. I must assume some want of experience in this field of research with reference to his early work, and conclude that he has described much that is foreign to the condition we are discussing.

Stargardt reports that in a case of bacteriolocally negative blennorrhœa neonatorum he has found a few typical trachoma caps. Schweichler describes a similar discovery. But Heymann was the first to ascertain that in blennorrhœa these corpuscles are frequently present, just as in trachoma. At the International Congress at Budapest he showed preparations from four cases of blennorrhœa neonatorum in which numerous typical caps were present, and I am bound to admit, after most careful study, that they are identical with trachoma bodies.

Flemming detected the structures in many cases of blennorrhœa neonatorum, and showed, above all things, that there are not cases of blennorrhœa neonatorum with gonococci and others with trachoma caps, but that the latter are present in one and the same preparation with the gonococci, and that this is frequently seen.

This fact cannot be too deeply emphasized. Halberstädter and v. Prowazek took a step further along the road of discovery when they detected chlamydozoa in the vagina of the mother of a child suffering from blennorrhœa.

As a matter of fact, we record the fact that trachoma bodies can be found in the genital organs of males and females who suffer from gonorrhœa. It should, however, be noted here that if Halberstädter and v. Prowazek postulate two separate diseases, one with gonococci another with cell inclusions, diseases which Lindner, drawing the logical conclusion, calls trachoma of the newly born and trachoma of the genitals, then these authors are in error. Allow me to base my opinion on a table drawn up by Flemming which describes one case as typical of many.

This table deals with a simple case of blennorrhœa neonatorum with moderate secretion. On the first days only trachoma bodies were present in the pus, then after the fifth day we find for a short time gonococci and trachoma corpuscles in one and the same preparation. As the suppuration increased, gonococci in large numbers appeared alone, and the trachoma bodies could be detected no longer. After about six weeks, the gonococci had vanished, and, finally, for fourteen days trachoma bodies were again present alone.

If such a case were examined in its early days we should find an inclusion blennorrhœa or a trachoma neonatorum; then for six weeks, a typical gonococcal conjunctivitis; and, finally, for fourteen days longer, an inclusion conjunctivitis.

TABLE.

Gonococci and trachoma bodies during the course of a case of blennorrhœa neonatorum.

No.	Date.	Final.	
1	15 October	Gonococci —	Trachoma +
2	20 October	Gonococci +	Trachoma +
3	24 October	Gonococci +	Trachoma —
4	1 November	Gonococci +	Trachoma —
5	6 November	Gonococci +	Trachoma —
6	20 November	Gonococci +	Trachoma —
7	27 November	Gonococci +	Trachoma +
8	6 December	Gonococci —	Trachoma +
9	13 December	Gonococci —	Trachoma +
10	29 December	Gonococci —	Trachoma —
11	6 January	Gonococci —	Trachoma —
12	7 March	Gonococci —	Trachoma +

I think this teaches us that we cannot speak of two diseases, but of stages of one disease, stages in which gonococci alone or inclusions alone are present. For if a case be followed up long enough, preparations will always be found in which gonococci and trachoma bodies lie close to one another. It is impossible to make two diseases out of it, and we have so far no fact which authorises us to speak of a trachoma either of the newly-born or of the genitalia, or to construct a new disease—"inclusion blennorrhœa."

In an example of typical gonorrhœal conjunctivitis adultorum we found gonococci and trachoma bodies, but they are doubtless rare under such circumstances.

E. A. Blakar has described the bodies in the infectious vaginal catarrh of children. His preparations have been on view here and I have not the slightest doubt that he has found structures quite different from those described by Prowazek and myself in trachoma (*Berlin. ärztl. Wochensch.*, 1919, No. 48).

Flemming has further found the typical hood form of the trachoma corpuscles in a case of diphtheritic conjunctivitis associated in the same preparation with diphtheria bacilli. This discovery cannot be doubted. They are present in the same preparation with streptococci, staphylococci, and pneumococci.

In the epidemic disease of swine (*Schweinrotlauf*), the first clinical symptom is often a reddening of and discharge from the eyes. These diseased eyes have been examined at the Imperial Hygienic Office at Berlin. Prof. Uhlenhuth has had the kindness to show me such preparations. Generally, typical trachoma bodies in cap form are present, and in all possible phases. In fact, it is hoped that their detection will help in an earlier diagnosis of the disease.

You are aware, further, that our discoveries are very similar to granules which were first found by Lippenschütz in molluscum contagiosum, so similar, indeed, that we can say that they stand or fall together. Nevertheless, the two can be distinguished ; both structures belong to the same category, but are not identical.

Quite recently P. A. Hoefer, of the Institute for Infectious Diseases, has described intra-cellular inclusion bodies in "scarlatina" (*Deutsche med. Wochenschrift*, Juni 8, 1911), concerning which he says: "After experience with chlamydozon one can suggest that these inclusions are of a similar nature" Thanks to the generosity of the author, his drawings lie before me. I can only say that his structures have no similarity to ours.

III.—The third and most important question is: *What, in the light of our present knowledge, is the significance of these structures?*

You are aware that at first everyone believed that they constituted a specific characteristic of trachoma, perhaps the long-sought cause of the disease. I have had to abandon this point of view, but it would appear that not all authors agree even to-day. Some have even attempted recently to unify the two diseases—trachoma and gonorrhœa.

After considering the above review of the question, these authors will no longer be able to maintain this hypothesis. The field in which the bodies have been discovered has greatly and surprisingly widened. The conclusion that everything in which trachoma bodies can be found is trachoma can no longer be sustained.

I still maintain the position that trachoma and gonorrhœa are two separate and very different diseases, which have nothing in common except that both affect the eye. If I were to state the grounds for my opinion in a few words, they would be shortly as follows.—In trachoma, follicles appear at first ; these soon become so numerous that they form the chief characteristic of the disease. The disease finally leaves behind a cirrhosis of the conjunctiva. In gonorrhœa, follicles practically never occur during the course of the disease, not even microscopically. No cirrhosis follows. It can be detected when the disease is over neither macroscopically nor microscopically. Gonorrhœa in the eye does not pass into a chronic condition. Whether the recovery of the eye is complete or whether the cornea is destroyed, nothing can be found in the conjunctiva after a certain time, not even by the microscopical investigation of excised portions, which I have frequently examined.

Further, gonorrhea is especially a disease of large towns, trachoma is essentially a disease of low-lying plain countries. I have even visited places in East Prussia where gonorrhœa is almost unknown, but trachoma very frequent. There are other reasons for my opinion.

I am naturally ready to abandon my position when cogent objections are advanced against it. But I can find no such objections in the trachoma body question as far as it has been cleared up at the present time.

Inoculation experiments, too, fail to convince me. Lindner succeeded, as is well known, in inducing upon the conjunctiva of apes a symptom-complex which was characterised by follicle formation, as in trachoma, by inoculating them with material taken from the vagina of a woman whose child was affected with blennorrhœa neonatorum with trachoma bodies, the so-called inclusion blennorrhœa neonatorum with trachoma bodies, a condition which the author calls "inclusion blennorhœa." Hoffstätter and Wolfrum succeeded with similar experiments.

The sceptic can advance against these experiments the objection that the presence of a few follicles does not constitute true trachoma. We know a large

number of irritants which are able to determine either follicle formation or the swelling of preformed follicles. In any case I cannot agree to throw over, at any rate at present, the results of clinical experience, solely on account of these uncertain experiments. Herzog believes that he has demonstrated the direct transition of gonococci into trachoma bodies. He calls the latter on this account "microgonococci." I confess that his written work does not convince me. But then I have not seen his preparations.

If we are obliged for the present to abandon the theory that all cases in which the corpuscles appear are trachomatous, then the question which was asked at the beginning comes more and more into prominence. Are we not perhaps dealing with a *cell degeneration*? Can we to-day regard this question as decided? I think not. We can, it is true, say that up to the present this kind of degeneration is unknown to us; we know of nothing analogous. These regular oval granules give the impression of a special organic structure. We find, too, cells with single granules, others with masses of them, and, finally, cells which are filled to bursting with them. An independent increase or an essential growth of these bodies has never been seen. They can neither be isolated, cultivated, or inoculated in pure culture. We are therefore far from strictly proving that they have a separate life: that they are, in fact, parasites.

Nevertheless, we can say that to-day the ablest bacteriologists, even those who at first maintained a severely sceptical attitude, are more and more of the opinion that the structures are definite micro-organisms.

This being so, we ought, after the above review of the presence of the corpuscles, to agree with the opinion first put forward by Flemming—namely, that it is purely a question of parasites which appear and multiply rapidly side by side with the real originator of the disease. We know of such a condition in ophthalmology. I need only remind you of the xerosis bacillus, which under certain pathological circumstances, rapidly multiplies, without, as far as we know, being itself pathological.

But in our domain the question is far from being quite simple. At any rate, we cannot make the general assumption that trachoma bodies appear indiscriminately in all and every desquamative catarrh. They are absent from simple non-gonococcal catarrh of the conjunctiva. It was an obvious proceeding to look for these bodies in canine distemper (*Stampe*). As in swine fever, so in distemper, the disease often sets in with lacrymation. But although they are invariably found in the first disease from the beginning, they are never present in the second.

If you now ask me what is my opinion regarding the significance of the bodies, my answer is easily given immediately, "I don't know." "I don't know what they signify."

You have perhaps seen from this summary that our discovery has been confirmed, but that the hope that the cause of trachoma had been found, has not been fulfilled. At any rate, it cannot to-day any longer be regarded as proved. It warns us to be doubly cautious with our conclusions and explanations, and when we see that as regards this question in a short space of time one and the same author has been obliged to alter his opinion three or four times, has had to accommodate himself to each new discovery, then, you must agree with me that the theories have been neither stimulating nor fruitful, but have been mere hindrances. It is, in truth, not the task of natural science to explain and clear up everything at once, but rather to collect facts. If sufficient facts are in our hands, the explanation generally appears obvious. Many authors to-day take up this expectant position.

I was inclined for some time to regard the structures as simple parasites,

saprophytes. When I talked over the matter with our best protozoologist, Professor Pfeiffer, of Breslau, he said to me, "They will soon have a pathological significance, only we don't yet know it." I have, therefore, temporarily retained the name "trachoma bodies," although it appears that it is no longer suitable. For there is nothing more confusing than to change a name before a question is thoroughly threshed out, and to make it conformable to a mere passing phase of opinion.

On the other hand, I do not take up the position of those pessimists who imagine that we have made no progress, but are only as clever as we were before. We have made a very characteristic and interesting discovery in the dark and difficult domain of trachoma.

The discoveries open up many possibilities and scarcely a month passes which does not witness the enrichment of our knowledge of them by new facts. In natural science the solid edifice grows but slowly by the accumulation of small closely united stones. Hope is ever present, that perseverance and critical research will ultimately furnish the solution of the problem before us.

T. Harrison Butler.

ON THE "SMALL FLAP" SCLEROTOMY IN GLAUCOMA.

BY

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Technique.

In May, 1910, before the Ophthalmological Society of the United Kingdom, I reported upon twenty-two "small flap" operations for glaucoma, six of which had been under observation for two years.

The earlier operations had been performed with a very narrow tapering Graefe

Fig. 1.

knife (Fig. 1), either in the lower-outer or upper-outer quadrant of the eye. After sliding the conjunctiva on the point of the knife, a 2 mm. scleral incision was made parallel with the corneal circumference, and 1·5 mm. from it (Fig. 2A), entering the anterior chamber close to its angle. At the two ends of this small section the edge of the knife was turned forwards, and incisions were made with slow sawing movements to the corneal margin (Fig. 2B). These two incisions formed the sides of the small flap, the primary incision the end of the flap, and the whole was subconjunctival, the conjunctival puncture remaining small, about 4 mm. from the limbus (*a* in Fig. 2C). The immediate outflow of aqueous produced considerable temporary conjunctival œdema. Before the operation the pupil was contracted, so far as possible, by physostigmine, and usually one or more instillations of adrenalin were made, in addition to cocaine, according to the degree of glaucomatous congestion of the eye.

Various modifications have been introduced into the *technique* with the effect possibly of making the small operation easier. It cannot, however, be said that the result of the operation has been made more certain. On the contrary, the average results of the later operations have seemed perhaps somewhat poorer than before.

Two knives are now commonly used in place of the narrow Graefe, namely,

a keratome (Fig. 3), for the primary incision, and a short blunt-pointed narrow blade for the lateral cuts (Fig. 4). This change was made primarily in order that the flap might be placed above the cornea instead of at the outer side. Bent instruments were consequently required The very small flaps first made were found insufficient to reduce the tension rapidly of very hard blind eyes. And it was thought that wider flaps, placed above the cornea (Fig. 5), on account of risk of prolapse of iris, might act better. This

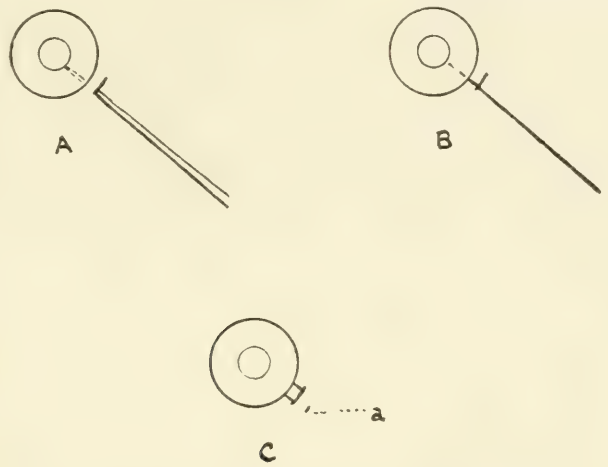


FIG 2. The earlier operation. (*a*)—Conjunctival Puncture.

question of wider flaps has not, however, been fully worked out, because of the risks inseparable from large incisions in glaucomatous eyes, unless preceded by posterior scleral puncture, as advocated by Priestley Smith. In Nottingham we do not now use a knife (bent broad needle) wider than 3.5 mm. (Fig. 3). The keratome and blunt-pointed narrow knife (generally

FIG. 3.
Sym's Iridectomy Knife, reduced in size.

FIG. 4.
Taylor's Cataract Knife, modified.

Lang's synechia knife) have continued in use for the outer side of the eye, because of the general feeling against working in an emptied anterior chamber with a sharp-pointed blade.

In using the keratome, its point is placed upon the eyeball four or more millimetres away from the cornea, and the movable conjunctiva is displaced with it towards the cornea, the position of large blood-vessels being avoided. In operating at the outer side, the sclerotic is entered 2 mm. to $2\frac{1}{2}$ mm. from

the corneal border. In operating above, the distance from the conjunctival limbus, at which the sclerotic is entered, may be increased to 3 mm. or more, if thought desirable, in the frequent cases in which the conjunctiva obviously overlaps the corneal margin more above than at the sides.

In eyes with more or less shallowed anterior chamber, *i.e.*, ordinarily in primary glaucoma, the point in puncturing the sclerotic is directed so as to enter the chamber immediately in front of the iris, and the onward movement is slow. The flap is thus made as long as practicable, measured at the inner surface of the cornea (Fig. 6). But it is not easy always to hit off the exact level of entry into the chamber correctly. One frequently finds that the knife engages the base of the iris, detaching it. This is satisfactory evidence that the puncture has been made at least deep enough, and in some cases a small irido-dialysis may be useful, serving instead of a peripheral buttonhole iridectomy. Pain experienced by the patient often indicates that the point of the instrument is penetrating uveal tissue

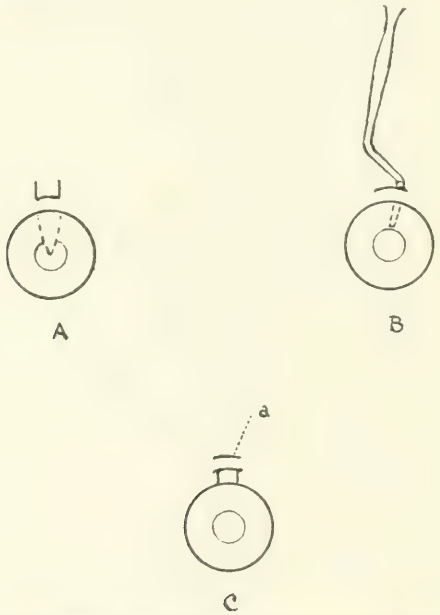


FIG. 5. The "Small Flap" operation. (*a*)—Conjunctival Puncture.

before it becomes visible in the angle of the chamber. It is important to locate the point of the knife as early as possible, in order to correct possible errors. A side-to-side or forward and backward rocking of the blade may enable one to detect the point, hidden by iris. The blade may have to be withdrawn a little, to disengage it from the iris, and passed on again closer to the cornea, to avoid making rather a large irido-dialysis.

If, on the other hand, the knife-point be found entering the chamber somewhat superficially, this can usually be corrected by partial withdrawal of the knife, without much loss of aqueous.

The narrow knife for the side cuts (Fig. 4) is introduced on the flat, well into the chamber but not usually as far as the pupillary margin (Fig. 5B). It is turned forward at one end of the primary incision, thus emptying the chamber, unless it is already emptied. The aqueous usually flows away directly through the conjunctival opening, producing no conjunctival œdema. The cutting is done by slow sawing, perhaps more in the withdrawal movements

than in the insertion movements. We have never found the least difficulty in avoiding injury to the lens, although the iris sometimes suffers a little.

In the insertion movements the end of the blade must be kept pressed against the cornea. The conjunctiva is commonly protected by its mobility and elasticity. Occasionally, the knife edge comes through the surface of the cornea or conjunctiva at the limbus, but this is of little or no consequence. Cutting the second lateral incision is a little more tedious, as the flap is now less fixed. The drag upon the eye in the making of the second incision produced an escape of vitreous in one buphthalmic infant upon whom I operated. The two incisions, of course, extend considerably beyond the level of the limbus at the posterior surface of the cornea (Fig. 6).

Physostigmine is again instilled if the combined effect of the adrenalin and cocaine has enlarged the pupil beyond the normal size. The eye is covered with absorbent wool for a day, and afterwards with a shield only. The anterior chamber is usually refilled next day. Should there be any considerable delay in this, the iris is apt to adhere more or less to the lateral incisions, and on this account it is well to continue the use of physostigmine. Afterwards, with the

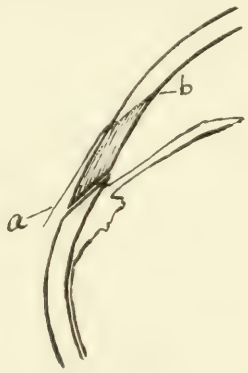


FIG. 6. (*a*) Conjunctiva. (*b*) Limit of forward cuts with linear knife = base of flap.

chamber refilled, atropine may be required to break down posterior synechiæ. The quite early use of atropine is also sometimes valuable to reduce the normal outflow of aqueous, and thus to increase filtration through the wound while healing is progressing.

In one case of acute glaucoma in a blind eye failure occurred through firm union of iris with the whole of the section. On this account iridectomy is indicated in acute glaucoma, unless the lateral incisions are made with N. Bishop Harman's scissors (*see later*). In a few of my early cases iridectomy was added, sometimes unnecessarily. Since then I have not found it necessary at all, except in cases of adherent leucoma. My colleague, Mr. W. G. Laws, who has performed over 50 of these operations, has not excised iris in more than one case.

In one blind eye a partially expulsive intraocular hæmorrhage occurred. This and the vitreous escape above mentioned, are the only accidents which have occurred in the performance of any of our Nottingham operations. In buphthalmic eyes, to avoid risk to the suspensory ligament, I should prefer in future, to use Harman's scissors.

Results.

It is yet too early to attempt more than a rough estimate of my own results. It is the less necessary since the operation is being largely tested by others. I have now performed 54 operations in this country as above

described, for glaucoma, primary or secondary. To the best of our knowledge, neither Mr. Laws nor I has failed by this method to relieve the tension in any case of primary glaucoma still retaining vision, except in one case, and in that the vision was only hand movements. But in hard blind eyes, congested and painful, I have had usually to be satisfied with relief of pain and congestion, the tension being only temporarily or partially reduced. Also, one case of tension secondary to cyclitis, with a little vision still remaining in the outer field, resisted repeated operations*. An eye with tension secondary to fundus hæmorrhage is still very hard, although painless, after two operations, one by knives alone, the other by Harman's scissors. Two considerable stapylomata have developed at the sites of the operations. In another similar case, operated upon with Harman's scissors. the result was also very poor, but I doubt if it would have been appreciably better if the operation had been performed with knives only. Such cases might be failures with any form of operation for the relief of tension. In a number of cases of primary glaucoma with good, or fairly good, vision, there has been a transient rise of tension two to four weeks after operation. But it has always passed away in a short time under a minimum use of physostigmine.

In the final results up to the present time there is usually a limited degree of filtration shown, apart from full reduction in tension, by a linear grey scar, representing a part or the whole of the section, under a more or less œdematous conjunctiva. The very interesting slides exhibited by Mr. Affleck Greaves at the Ophthalmological Society in July of this year, show at least that true filtration through loose fibro-cellular tissue filling the wound can take place after this operation. In a few cases localized fistulous points develop. The conjunctival œdema varies considerably in different cases, quite apart from any condition of the eye before operation. There are evidently unappreciated and unintentional variations in *technique*, which influence the result considerably. It is fair to assume that the greater the œdema the freer the filtration. This is usually borne out by the resulting tension, which, however, has never been reduced very much below normal. But in a few cases with tension reduced to normal, there has been no conjunctival œdema at all.

Free filtration tends to produce localized opacity of the conjunctiva. One may notice in eyes still congested within a few weeks of the operation, a milky pallor of part of the swollen conjunctiva over and near the wound. Later, when all trace of injection of the eye has disappeared, the only noticeable evidence of opacity remaining is one's inability to see the underlying scleral scar.

So far as we can tell, the relief of tension, after the first month or so, is permanent. I have had one recurrence of tension later. But it was in a case of secondary glaucoma, with anterior synechia, following a corneal wound. And after the glaucoma operation, two other operations had been performed, one for extraction of the lens and the other for extraction of capsule.

Mode of Action.

In the immediate future it appears advisable to test fully the principles upon which the operation is based. For some modification seems needed to provide the very free filtration required for the full reduction of tension in very advanced glaucoma, with obliterated filtration angle. To this end we need to observe closely the variations in results following slight, and perhaps unintentional, alterations in *technique*. It appears useless simply to repeat the procedure without change in any case of failure.

The main idea underlying the method is, as with my "wedge" operation,

* Trans. Ophth. Soc. U.K., 1911.

that of shrinkage of isolated tissue, such as takes place with grafts. The small flap presents a considerable bulk of tissue, normally vascular, which must for a time remain very poorly nourished, mainly through its basal attachment to non-vascular cornea. And the flow of lymph from the cornea is reduced by the deep extension of the lateral incisions in the cornea. Delayed union is thus accounted for, and some slight progressive shrinkage may be expected until new vessels have grown in from the surrounding sclerotic. That shrinkage does actually take place is, I think, borne out by the clinical observation of the transient nature of the moderate recurrences of tension after operation above mentioned, the final relief coming without any perceptible elevation of the flap. Occasionally, also, one may notice during the earlier months, some broadening of the subconjunctival cicatrix at the end of the flap. This shrinkage explains also the uniformly good results obtained in the more chronic forms of glaucoma as contrasted with the very poor results of ordinary iridectomy in the same.

If this explanation be correct, the longer the flap, the greater the shrinkage should be, and the surer the result. It must be admitted, however, that very short flaps have acted well in our practice so far. It should be practicable to reduce the nutrition of the flap, with the object of promoting shrinkage, by

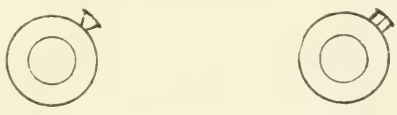


Fig. 7. Suggested modifications in the "small flap" operation.

narrowing its base, if necessary to vanishing point (Fig. 7A), as suggested to me by Mr. William Lang. So far I have scarcely attempted to utilize this idea. In order to apply this modification, the primary incision should be made with the point of a broad triangular keratome Otherwise, the second of the sloping lateral incisions would be difficult to make, owing to mobility of the base of the flap.

Another means of reducing the nutrition of the flap, which I carried out once or twice while in India, is to divide the flap into two (Fig. 7 B). The middle incision is made before the two lateral ones.

In one of my cases unusually free filtration, shown by subnormal tension, considerable conjunctival œdema, and conjunctival opacity, appeared to be attributable to double puncture with the keratome. The first puncture being too superficial, the blade was nearly withdrawn and passed on again more deeply. It is obvious that dividing the flap up in this way must interfere with healing. Upon one or two later occasions I have tried this double puncture with the object of increasing filtration. But it may prove difficult to accomplish satisfactorily, owing to premature escape of aqueous ; and the effect was not very evident in these cases.

In the original operations performed with the narrow Graefe knife, it was thought that the immediate conjunctival swelling produced by escape of aqueous might have drawn the flap a little forward by pull on the limbus, separating the wound surfaces, and so assisting in securing permanent leakage. And, possibly, the somewhat poorer average results obtained since we have operated with a keratome may be attributable to the usual absence of this immediate conjunctival œdema. I have lately endeavoured to test this point by placing the conjunctival puncture as far away from the cornea as

* *Trans. Ophth. Soc. U.K.*, 1911.

practicable, and by regulating the escape of aqueous after quick withdrawal of the keratome. Possibly, also, separation of the wound surfaces by blood may serve the same end. Hence, a somewhat limited employment of adrenalin before operation.

Any early return of tension after operation tends to relieve itself by forcing the flap forwards. The earlier the recurrence, the more noticeable is the displacement of the flap. I have known the tension above normal within a week of the operation. Short of raising the tension above normal, the instillation of atropin within the first week or ten days tends to increase the filtration through the wound, by restricting the normal outflow. A very slight permanent elevation of the flap may often be noticed, without even a temporary rise of tension and without any use of atropin. It may be seen without conjunctival œdema.

Bishop Harman's "Twin Scissors."

I have reserved what I have to say about Harman's ingenious scissors, not through lack of appreciation of their value and importance, but because their employment alters the small flap sclerotomy very considerably. Harman has elsewhere* sufficiently described their use. As first described, they necessitated the reflexion of a conjunctival flap, which afterwards, in my experience, became somewhat fibrous, thereby lessening filtration. Thirteen of my cases treated with the "twin scissors" gave poorer average results than those obtained with knives alone. Since the scissor-cuts do not extend, like the knife-incisions, beyond the level of the limbus at the deep surface of the cornea, the nutrition of the flap is probably less interferred with, and the shrinkage may perhaps be less. The flap apparently also does not swing forward quite so readily. On the other hand, it is sometimes an advantage that there is practically no liability to the formation of anterior synechiæ. Thus, even in acute glaucoma, one is enabled to dispense with iridectomy ; and the scissors are perhaps best suited to buphthalmic eyes.

Lately, in half a dozen cases, I simplified the operation by cutting through both conjunctiva and sclera with the scissors, after pinching up the conjunctiva with forceps, as mentioned by Harman in the present issue of "THE OPHTHALMOSCOPE" (p. 769). It is too early to say anything very definite as to the results of these cases. There was one definite failure, where tension was secondary to iritis. One operation upon acute primary glaucoma seems to be quite a success.

ON CONJUNCTIVAL INCISIONS IN HERBERT'S SCLEROTOMY.

BY

N. BISHOP HARMAN, M.B., F.R.C.S.,

LONDON, ENGLAND.

IN Herbert's original mode of performing his "small flap" sclerotomy with knives the only conjunctival incision is that made by the keratome, and beyond insuring that the membrane is cut a short distance behind the scleral incision, nothing has to be considered.

In performing the operation with the "twin-scissors" the method of getting the conjunctiva out of the way, so as to allow of the scleral cuts, has to be arranged for.

I have tried a number of conjunctival incisions:

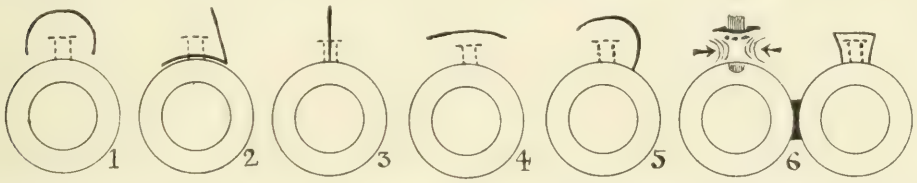
1. That indicated in the description of the twin-scissors*, which was merely

*THE OPHTHALMOSCOPE, February 1st, 1911, p. 109.

cutting and turning forward a flap over the cornea, the sides of the flap were cut to within a couple of millimetres of the limbus somewhat in the fashion adopted by Elliot for trephining the limbus (fig. 1). After making the scleral cuts, the flap was replaced and healed well, the undisturbed conjunctiva close to the limbus on each side giving ample room for the transudation of the filtering aqueous. The one trouble connected with this flap was the fact that when it was turned over on to the cornea, it obscured the upper part of the anterior chamber, and so partly blocked the view of the further steps of the operation.

2. To avoid this trouble, the flap was next cut so as to turn away from the cornea. One limb of the incision followed the limbus, and from one end of this a cut was made backwards for 5 mm., and the triangular flap was then turned sideways (fig. 2). The further steps of the operation were perfectly clear, and at the finish the flap was replaced and its apex stitched to the limbus. The method was convenient in operating, a wide undisturbed drainage area was left, but the limbal edge of the flap tended to retract, so that the scleral flap was left partly bared for two or three days until healing drew it into place.

3. A single vertical incision was tried (fig. 3). The lips of the wound were held apart, and the scleral cuts made within the lozenge-shaped opening; the method was not handy; it required too many hands.



Illustrating various conjunctival incisions for Herbert's sclerotomy. In each case the continuous line represents the conjunctival incision, and the dotted line the scleral incisions. 1 to 5 are separate methods. 6 on the left is the first stage of Herbert's method of cutting conjunctiva and sclera together; the male blade of the twin-scissors has entered the anterior chamber, the arrows represent the toothed-forceps gathering up the fold of conjunctiva. On the right is the finished operation.

4. A single horizontal cut 5 mm. from and parallel to the limbus was tried, the conjunctiva betwixt the cut and the limbus being lifted and undermined with scissors, and then the scleral cuts being made beneath it (fig. 4). This took rather too long a time; the conjunctiva was apt to be torn; there was difficulty in insinuating the twin-scissors so as to get the scleral cuts right up to the limbus; and in making the cuts the conjunctiva at the limbus was button-holed.

5. A modification of the first flap was then tried and of the foregoing proved the most successful, both in peformance of the operation in all its stages, in rapidity of healing, and in allowing unimpeded transudation of the aqueous. A fold of conjunctiva vertical to the limbus was lifted with forceps and cut across, the cut was then carried right to the limbus on one side, but short of a limbus by 4 mm. on the other; the flap, when dissected up, was turned sideways and the scleral cuts were made (fig. 5). A clear view of the operation was given, the flap was uninjured, and when turned back, covered the sclera well and required no stitch.

6. The last five of my cases have been performed in a manner of which Herbert told me (figs. 5 and 6). The conjunctiva and sclera are cut simultaneously, but the conjunctival cuts are so arranged as to be wide of the scleral cuts. First, the keratome is used to incise conjunctiva and sclera parallel to the limbus, the conjunctival cut being a few millimetres behind the scleral cut. The male blade of the twin-scissors is now slipped under the sclera until its projecting end appears within the anterior chamber. Then, the line of the male blade is straddled by a pair of fine toothed forceps which engage in the membrane

about 4 mm. apart and 2 mm. from the limbus, the forceps are closed, and a fold of conjunctiva drawn up coinciding with the male blade of the twin scissors. The scissors are then closed down, the female blades coming down one on either side of the forceps holding the conjunctival fold, so that they cut through the conjunctiva and sclera simultaneously. There results a compound sclero-conjunctival flap, the overlying conjunctival layer being appreciably larger than the scleral layer in all directions. (If preferred, the fold can be lifted up prior to the insertion of the male blade of the "twin-scissors" along the scleral wound.) The edges of the conjunctival flap readily unite in their original positions, and since there is no disturbance of the delicate connective tissue betwixt conjunctiva and sclera, transudation of the aqueous is unimpeded. From the experience of five cases I am convinced that this last mode of operation is by far the most elegant and expeditious way of producing the "small flap" sclerotomy, and the reaction caused by the operation is the smallest possible.

THE CRYSTALLINE LENS AS FIGURED IN THE TEXT-BOOKS AND AS SEEN IN THE EYE.*

BY

LUCIEN HOWE, M.D.

BUFFALO, N.Y.

IT is ordinarily supposed that the crystalline lens occupies the ideal position represented in the textbooks, that the axis of the lens passes through the centre of the cornea, and that the vertical and the horizontal diameters are exactly at right angles to its axis. Moreover we usually take it for granted that during the act of accommodation the two surfaces of the lens become more convex, always in an equal and regular manner.

The object of this paper is to call attention to the fact, that most of these assumptions are not warranted, at least not in the majority of what we call normal eyes.

This statement naturally divides itself into the consideration of four points, which are: —

I. **The instrument for viewing the reflections from the two surfaces of the lens, the phacometer.**

Attention was called to the fact that the phacometer is nothing more than a good telescope with appliances for measuring the positions which the entoptic images have with relation to each other, and the changes which those images undergo during the act of accommodation.

The ordinary ophthalmometer can be transformed with slight modifications into a phacometer. A model of the Tscherning's phacometer was shown with the modifications of it made by the writer. This consisted in an erecting eye piece, and in a head rest suitable for this and for many other examinations of the eye. This phacometer is figured in Tscherning's *Physiologic Optics*, page 44, Fig. 32, and also in the article by Besio in the *Journal de Physiologie et de Pathologie général*, juillet, 1901, page 548.

II. **Formulæ for calculating the position of the lens, and the changes which it undergoes.**

*Abstract of a communication read before the American Academy of Ophthalmology and Oto-Laryngology on September 25th, 1911.

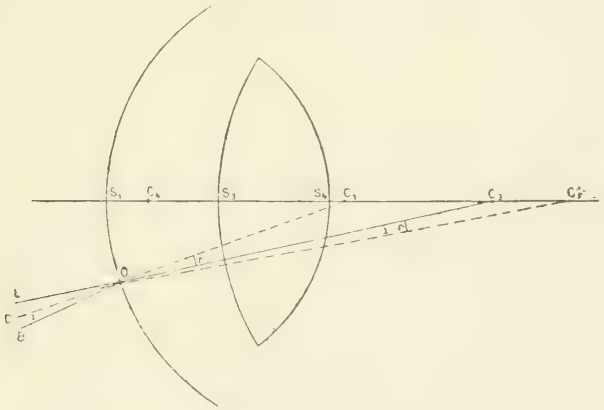
It requres ordinarily a rather long and tedious computation to calculate the position of the surfaces of the lens from the reflections. These calculations can be much abbreviated by the use of certain formulæ used by Tscherning at the Sorbonne, and afterwards in other ophthalmological laboratories. In these formulæ—

(A) Represents the distance of the single light from the axis of the telescope.

(B) The distance of the double light, and

(C) The distance of the fixation point from the axis of the telescope. In these formulæ also S_1, S_3, S_4 represent respectively the anterior surface of the cornea, the anterior surface of the lens and posterior surface of the lens. C_1, C_3, C_4 represent respectively the centres of curvature of those surfaces.

With this understanding we have the following :—



Refracting surfaces S_1 S_3 S_4 with their centres of curvature C_1 C_3 C_4

$$S_1 S_3 \text{ or depth of the anterior chamber} = R_1 \frac{A - B}{A - \frac{1}{4} B} \qquad (1)$$

(B) For the distance of the centre of curvature of this anterior surface behind the front of the cornea we have

$$S_1 C = R_1 \frac{C + \frac{1}{2} B}{C + \frac{1}{8} B} \qquad (2)$$

II. For the posterior surface of the lens

(A) For the position of this surface we have

$$S_1 S_4 = R_1 \frac{A - B}{A} + 0.3 \text{ mm.} \qquad (3)$$

(B) For the center of curvature of the posterior surface we have

$$S_1 C_4 = R_1 \frac{2C - B}{2C} + 0.2 \text{ mm.} \qquad (4)$$

It is a simple matter to make use of these formulæ, and in a few minutes to calculate the position of either surfaces of the lens from the cornea.

III. **The result of these measurements.**

It may be said briefly: first, as to the positon of the lens. It is very seldom in the ideal position shown in the textbooks because

(A) The anterior end of its axis points temporalwards.

(B) The anterior end of that axis also points usually somewhat downward.

Second, during accommodation the entire lens apparently moves slightly downward.

Third, as to the changes which take place in the two surfaces of the lens during accommodation.

(A) The posterior surface as a whole changes but little. This increase in its convexity thought slight is quite regular.

(B) The anterior surface of the lens as a whole does change, and to a very decided degree. The curvature is not regular, but the central portion assumes a kind of conical projection or bulging forward.

(C) The curvature of parts of the posterior surface change irregularly as compared with other parts. This perhaps is also true of the anterior surface, but the relative position of the blurred reflection from this surface cannot be seen so clearly with any phacometer thus far made.

IV. **Clinical Importance of the mal-position or of irregular curvature of the lens.**

It is evident that any displacement or irregularities in the surfaces of the lens will produce a certain amount of astigmatism. This was long ago recognized as lenticular astigmatism.

It is true that the astigmatism produced by displacement is usually only of a slight degree, probably not exceeding 0.75 diopters in most cases.

But evidently the important point is that displacement or especially the varied and unequal changes in the surface call for correspondingly varied and unequal demands upon different portions of the ciliary muscles. Concerning this general proposition there can be no doubt. Already a number of notes have been made which indicate that this subject is of very decided clinical importance in relation to those, as yet undefined symptoms called asthenopia. But those notes are not yet sufficient to warrant definite conclusions. A paper like this is quite long enough if it only attempts to indicate the instrument with which the observations are made, the formulæ for making the calculations the results obtained, and a mere glance at the clinical value which such observations have.

A CASE OF INTUMESCENT CATARACT LEADING TO ABSOLUTE GLAUCOMA.

BY

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LONDON, ENGLAND.

Clinical Facts.

ON September 18th, 1907, I was consulted by a gentleman, aged 75 years, on account of the state of his right eye, which was blind, painful, and inflamed.

Twenty-five years ago the right eye sustained some slight injury from a splash of croton oil. It soon recovered. But for the last five years the sight of that eye has shown a slow and painless failure. It is now complete, the patient being unable to tell day from night. The vision is stated by the patient to have failed first in the outward part of the field. The eye has been inflamed for ten days, but Mr. D—— is certain that it was blind prior to the onset of the inflammation.

On Examination.—The right eye shows deep scleral and ciliary redness. The cornea is hazy and vascular. The anterior chamber is extremely shallow.

The pupillary area is occupied by a diffluent-looking lenticular mass. V. = no perception of light. T. *plus* 3. Transillumination gives a fair glow through the pupil when the instrument is applied to the anterior parts of the eyeball.

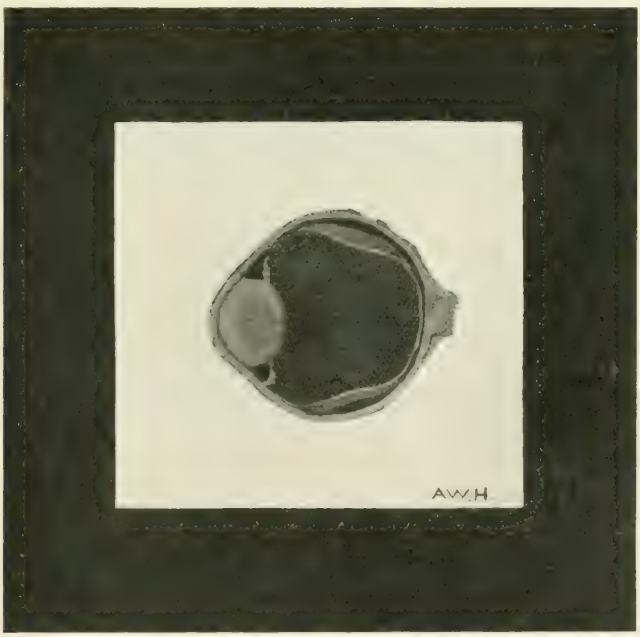
L.V. = 6/36 (1) *plus* 2.5 D. sph. = 6/12 (V). T.n. The optic disc does not appear to be cupped. The field of vision for a 5 mm. white square shows a slight general contraction.

Treatment.—On September 23rd, 1907, under chloroform, the right eyeball was enucleated.

The immediate transillumination of the specimen yielded negative results.

Pathological Examination.

The right eyeball, frozen and divided by a vertical antero-posterior section, measured 24 mm. by 22.5 mm. The swollen crystalline lens lay in close contact with the posterior surface of the cornea, no anterior chamber being visible (see figure). It possessed its customary shape, and showed no evidence of ruptured capsule. Its cortical layers were greyish-white, but its nucleus had a tinge of



yellow. It measured 8.5 mm. in an anterior-posterior direction, and 10.5 mm. laterally. The posterior portion of the globe manifested no obvious abnormality, but the optic disc was not included in the hemi-section examined macroscopically.

The anterior *corneal epithelium* was œdematous, vacuolated, and eroded in places, and here and there actual vesicles, of small size, were present. Towards the periphery of the cornea a kind of pannus-like tissue lay between the anterior epithelium, on the one hand, and Bowman's membrane, on the other. It formed a delicate, vascular, fibro-cellular layer. A number of blood-vessels were present in the anterior layers of the *substantia propria*, the lamellæ of which showed numerous cross-markings, like those not infrequently seen in elastic fibres from the ligamentum nuchæ, and, like the last-named,

they were probably due to tension. Some of the posterior layers of the substantia propria, immediately anterior to Descemet's membrane, stained deeply with eosin and with carmine, and appeared to have undergone hyalin degeneration. The *endothelium* was here and there replaced by many pigmented cells, apparently derived from the iris.

The *iris* was reduced to a thin, and deeply, though irregularly, pigmented sheet, in which little evidence of normal structure could be made out. The atrophic iris had become widely incorporated at the sinus of the anterior chamber with the overlying structures. No trace could be found of the sphincter iridis. There was no definite extension of the uveal pigment around the edge of the pupil on to the anterior surface of the iris (*ectropion uveæ*).

The sub-capsular layers of the *crystalline lens* showed evidence of hyalin change. In some sections vesicular cells, of large size, lay between the capsule and the disintegrated cortical fibres. The cataractous lens included a nucleus that showed relatively little change beyond œdema. On the other hand, the cortical layers were made up of island-like tracts of Morgagnian globules separated by dissociated and altered cortical fibres.

The irregularly thickened *capsule of the crystalline lens* formed a continuous investment for the anterior half or so of the lens, but traces only could for the most part be seen covering the posterior half. Clumps of flattened capsular epithelial cells could be seen in various parts of the specimens.

The *ciliary body* was pigmented and atrophic.

Both the *retina* and the *choroid* were atrophic.

NOVELTIES.

THE ACUTOMETER.

Mr. H. Milner Black, of 3, Windlesham Gardens, Brighton, has devised an instrument whereby he claims that the visual acuity may be determined with accuracy, precision, and rapidity. To this appliance he has given the name of an "Acutometer."

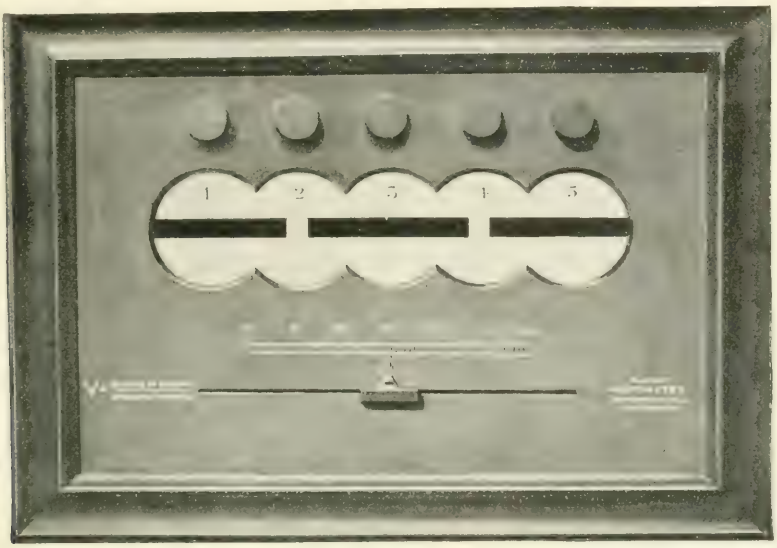
The "Acutometer," as shown by the figure, consists of an oblong ebonized frame, measuring about 13 inches in length by 9 inches in depth, intended to be hung upon the wall of the consulting-room in a good light. An indicator is capable of being slid along a metre scale, and, as it does so, the black line shown in the figure widens to a proportionate extent, with the consequence that the two white squares, formed by the separation between the black lines, become larger and larger. The number and position of these squares can be changed by turning one or more of the five screws shown in the upper part of the illustration.

The way to use the "Acutometer" is described as follows by the inventor.—"From any convenient distance, measured in metres, the observer should indicate when and where these white squares can first be seen, and the exact result may be verified by repeated trials."

$$\text{Acuteness of vision} = \frac{\text{Distance of Observer}}{\text{Standard Distance}}, \quad \text{or V.} = d/D.$$

The visual acuity can be recorded in simple fractions, *e.g.*, 5/8, 6/5, or in decimals, *e.g.*, V. = 0·625 or 1·2, etc.

Among the many advantages claimed for the "Acutometer" the following may be mentioned.—It reveals minute differences in visual acuity; it can be



used with ease and rapidity; it affords an unlimited number of variations, and is likely to be of service when dealing with children, the deaf-and-dumb, and illiterates. Finally, as the working parts of the appliance are of metal and vulcanite, it should last a life-time.

The makers of the "Acutometer," the price of which is 45s. net, are Messrs. Gowlland Brothers, Croydon.

IMPROVED TWIN SCISSORS FOR SCLEROTOMY.

BY

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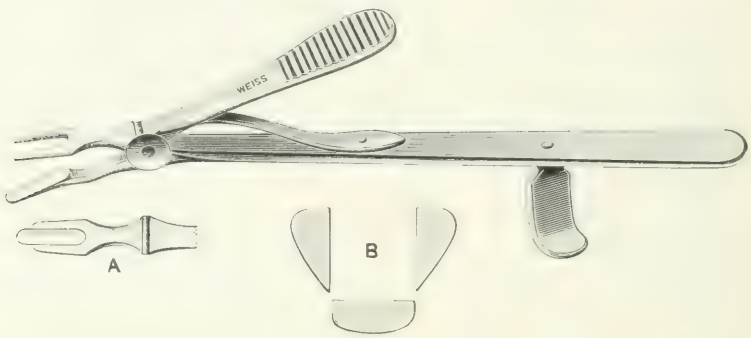
The Twin Scissors devised for the purpose of making the essential part of Herbert's "small flap" sclerotomy operation for chronic glaucoma, and described by me in The Ophthalmoscope of February, 1911, were found capable of useful work, but they had certain defects in their working, the lateral hinge of the first pattern necessarily allowed sufficient play for the male blade to engage one or other of the female blades unequally, so that the cutting action was checked. The male or female blades were not always engaged—or, to use a term applied to motor gears, not always "in mesh"—so that the cutting was jerky. Also, there was no means of limiting the opening of the scissors. In the improved pattern, now figured "A," it is believed that these defects are completely remedied.

At the suggestion of Mr. W. G. Laws, of Nottingham, the lateral hinge has been changed to a central hinge which gives perfect stability. The male blade is now always in gear betwixt the female blades, and the female blades have been given a lateral spring, so that in cutting the sharp edges cling to and shear along the cutting edge of the male blade, just as the slight twist of the



fingers causes the blades of an ordinary scissors to grip and shear along each other. A stop screw has been attached, so that the play of the jaws can be adjusted to a nicety, and undue recoil of the spring checked.

The new twin scissors have been used already in several operations, and the improvement is manifest.

The new pattern is made by Messrs. John Weiss, of 287, Oxford Street, London, W.

REVIEW.

THE FIELD OF VISION.

(Continued)

BY

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Part II.

FIELDS OF VISION IN DISEASED CONDITIONS.

Glaucoma.

Investigation of the field by Bjerrum's method shows that in glaucoma the area of relative defect can always be traced to the blind spot, provided a small enough test object be used; or, in other words, "the area of most acute vision, as also the area of relative defect, are in contact with the blind spot, or may be said to meet at the blind spot" (Sinclair). This is now often referred to as *Bjerrum's symptom*. Other characters of the field in glaucoma, but of secondary importance, are referred to by Sinclair[1], *e.g.*:—(a) The field for a small test object often extends in a semilunar form, or as a horn-shaped projection round the lower or the upper margin of the blind spot to the temporal side (Fig. 1). (b) In some cases a semilunar-shaped field may be

THE FIELD OF VISION,

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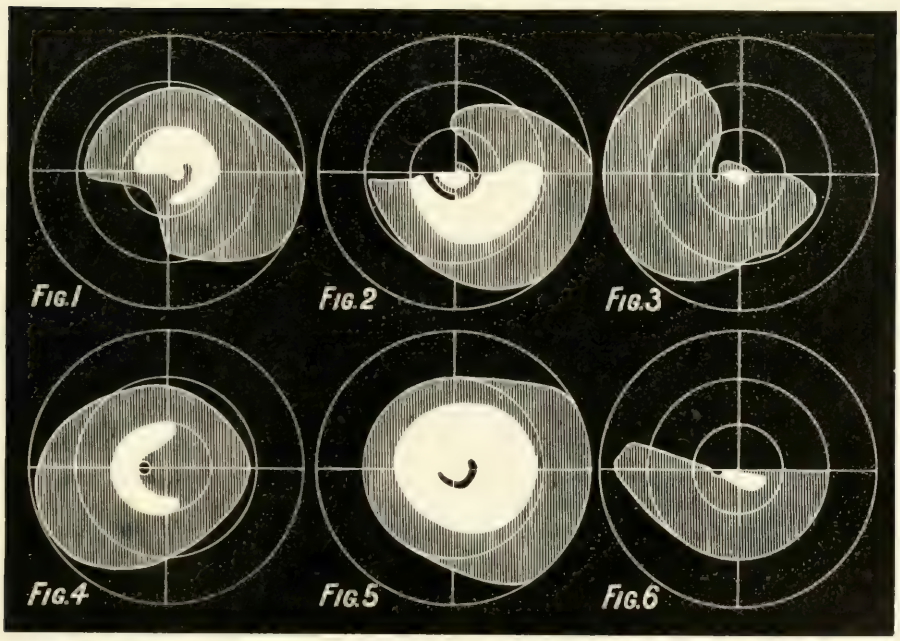

found isolated on the temporal side of the blind spot, with its concavity towards the blind spot (Fig. 2.) This is associated with a small oval or round central field which generally persists after the eccentric field has disappeared (Fig. 3). Sometimes the central field disappears before the semilunar portion (Fig. 4). (c) Paracentral scotoma, forming an arc round the point of fixation, and with its concavity towards that point, is not uncommonly met with. Such scotomata never reach beyond the blind spot on the temporal side, but may extend to the periphery on the nasal side (Figs. 1 and 5).

Rönne[2] has also carefully studied the character of the visual field in glaucoma as shown by the method of Bjerrum, and by the ordinary perimeter. The difference in the dimensions of the field as shown by these two methods, are graphically represented in Figs. 1 to 5, where the ordinary field is indicated by parallel lines, and the "Bjerrum field" is shown in white. It will be observed that the difference in the character and size of the fields according to the method of testing employed is very striking, and often very extensive. Rönne draws particular attention to the frequency with which small paracentral arciform scotoma is met with. Such a scotoma shown absolute is indicated in Fig. 5, where the peripheral field is full. The arc may pass above or below the point of fixation, and extends from the physiological blind spot to end about the horizontal meridian on the nasal side, where it may connect up with the nasal defect. It may entirely surround the fixation point (Fig. 2), or it may expand into a comet-shaped defect (Fig. 1). The fibres chiefly concerned in these defects are either the upper or lower arciform fibres which enclose the macular area; the macular fibres themselves, and the radially arranged fibres supplying the nasal part of the retina remain unaffected for a longer time.

Rönne[3] has also investigated the changes in the nasal field in glaucoma. The nasal defect shows a sharp step-like margin, the base of which closely follows the horizontal meridian. This "nasal step" (*der nasale Sprung*) (Figs. 1, 2, 3) is best demonstrated on an ordinary perimeter, but the test object should be moved in a circular manner, or if the radial method be adopted, care should be taken that the whole field be minutely investigated and not a few radial diameters only. Extension of the defect along the horizontal meridian into the temporal area produces the vertical hemianopic field occasionally noted in glaucoma. Rönne points out that the line of division is more irregular on the temporal than on the nasal side in these cases (Fig. 6). It must be remembered, however, that neither the "nasal step" nor the arciform scotoma is characteristically pathognomonic of glaucoma, as similar changes may occur in such diseases as retrobulbar neuritis, hæmorrhagic neuro-retinitis, and embolism of a branch of the central retinal artery.

In many cases of glaucoma, areas of uncertain and evanescent vision, due to rapid exhaustion of the retina, may be observed.

Squint and Congenital Amblyopia.

Heine[4] found that careful examination by Schlösser's method of persons suffering from congenital amblyopia, elicited the fact that there was a central scotoma present in 90 per cent. of the cases where vision ranged from $\frac{1}{2}$ to $\frac{1}{20}$th or less. The defect was almost always objective (negative) in the congenital cases, and subjective (positive) in cases of acquired amblyopia; but we should hardly be justified in accepting this as a conclusive test in the differential diagnosis between congenital and acquired amblyopia.

Heine seldom found any appreciable contraction of the peripheral field in cases of squint and congenital amblyopia.

Scrini and Fortin,[5] investigating similar cases by Schlösser's method, Haitz's cards, and other tests, found central scotoma in 15 out of 16 cases where the vision was less than $\frac{1}{10}$th. The scotoma was generally relative, although occasionally it was absolute; it was often very small (3°-15°) and round, oval, or irregular in shape. The visual deficiency was not very closely related to the size of the scotoma—a scotoma of 4°-5° being sometimes associated with very low visual acuity, *e.g.*, $\frac{1}{15}$th, and vision of $\frac{1}{4}$th being retained where the scotoma was quite extensive.

Visser[6] found neither central scotoma nor restriction of the peripheral field in congenital amblyopia when the investigation was made with the sound eye closed; but if the examination was made by Schlösser's method, he often found a *functional* scotoma due to exclusion (suppression) of the central part of the field of the amblyopie eye in binocular vision. As it cannot be demonstrated monocularly, Visser argues that the scotoma must be functional, as it can hardly be assumed that a scotoma of 20°-30°, as described by Heine, could escape detection however bad the fixation. In this view, however, Heine does not acquiesce.

Sympathetic Ophthalmia.

Freeland Fergus[7] has described a form of degeneration, dependent upon sympathetic disease, in which there is concentric contraction of the visual field but no inflammation of the eye. There is an associated amblyopia, but it does not pass on to complete blindness. Nuel[8] described the same, or a similar, condition under the name of "sympathetic amblyopia," and although he noted slight optic neuritis or pallor of the macular bundle or perivasculitis in some cases, he regards the condition as being akin to the traumatic neuroses, and the contraction of the visual field as being probably of a similar nature.

Ramsay and Sutherland[9], carrying out their investigations with Bjerrum's screen, found that in cases of congestion of the optic disc there is a spindle-shaped enlargement of the blind spot. The modification in shape and size is determined by the turgescence and increased size of the superior and inferior retinal vessels, as the alteration in size is altogether in the vertical meridian, there being no change in the horizontal width. It is to be observed, however, that in some cases recorded by these writers the condition of the fundus remained unchanged, even when the blind spot had resumed its normal shape and size.

In cases of penetrating wounds of the eye, the appearance in the uninjured eye of enlargement of the blind spot, congestion of the optic disc, a transitory degree of low myopia, and subjective irritation, however slight, are regarded by these writers as signs of *sympathetic irritation*. They furnish valuable danger signals of the approach of sympathetic inflammation, and indicate the necessity of the immediate enucleation of the exciting eye.

The normal relation of length to width of the blind spot is 6: 4. In all cases where comparisons of the size of the blind spot are made, the same method of examination should be used, since, as pointed out by Ovio[11], the size of the blind spot appears much larger when measured with a light test object than when a dark object is employed. This, however, should not alter the relationship of length to breadth of the blind spot in individual cases.

Retinitis Pigmentosa and Allied Conditions.

Working with a McHardy perimeter and a 10 mm. test object in good daylight, Hepburn[12] investigated the condition of the visual fields in pigmentary degeneration of the retina, and found that their main characteristics in

I. *Primary degeneration of the retina* (*retinitis pigmentosa*) are :—

The presence of the ring scotoma which usually attacks an area between the 40° and 10° circles and often extends farther out on the temporal side. It may assume many variations in shape and completeness and not infrequently exhibits several islands of vision scattered throughout the blind area. The ring is incomplete at first, and the scotoma may be absolute or relative or partly one and partly the other. In some cases a double ring scotoma has been noted. Careful observations also showed the order in which the various portions underwent degenerative changes, *viz.* :—(*a*) First the mid-peripheral region commencing on the nasal side. When the ring is complete the peripheral portions show loss of vitality in the following sequence :—(*b*) the extreme lower part of the retina ; (*c*) the upper and outer portions ; and, lastly, (*d*) the lower and outer parts. Thus the whole of the temporal half entirely loses its function before (*e*) the nasal half begins to degenerate. In the nasal segment the progress of the degeneration is more rapid downwards, so that at last only a small portion of the upper and inner quadrant remains. (The fields illustrated do not appear to bear out this statement very clearly.—J.J.E.) (*f*) Finally, when the whole peripheral field has been obliterated, the macular region is attacked and destroyed. Occasionally, the central field disappears before the peripheral, but Hepburn regards these as cases of chronic choroiditis which have assumed the appearance of retinitis pigmentosa.

II. *Secondary pigmentation of the retina due to chronic disease of the choroid.*

It is not always easy to draw a distinction between primary and secondary pigmentary degeneration of the retina by ophthalmoscopic examination alone, and often there is considerable overlapping of the two types. Hepburn finds that the field of vision may serve as a valuable guide in their differentiation.

In chronic disease of the choroid the characteristic feature of the field of vision is the patchy nature of the scotomata, which are of all shapes and sizes, and are scattered indiscriminately all over the field, but are often more numerous in the intermediate zone, and the type is apt to revert to that of primary degeneration of the retina. The scotomata often remain stationary for a very long time, and there is some slight general contraction of the peripheral field.

Hepburn did not find any very close relationship between the amount of retinal pigmentation and the defect in the field in retinitis pigmentosa, except in so far that abundant pigmentary deposits were always associated with great defects in the field. The converse, however, did not hold good, as very defective fields were found in cases where there was little evidence of pigmentation of the retina.

Hancock[13] found ring scotoma in a case of *retinitis pigmentosa sine pigmento*. He also reported an interesting case of ring scotomata, with normal central vision, the result of a lightning stroke.

By using brilliantly illuminated test objects, *e.g.*, an electric lamp, Koellner[14] found that parts of the peripheral fields, more or less extensive, were retained at a very late stage of pigmentary degeneration of the retina.

Oatman[15] has described a case of retinitis pigmentosa in which the pigmentary degeneration began at the maculæ, and was associated with central scotoma.

Krauss[16] has also reported a case in which there was a ring scotoma, but the hemeralopia was more marked centrally than peripherally.

Retinitis punctata albescens.—In the cases originally described by Mooren[17] there was relative or absolute central scotoma, while the periphery of the

field was said to be unaffected. Similar fields were recorded by Hirschberg[18] in two cases which he designated *central punctate and striate retinitis*. Fuchs,[19] however, drew attention to the similarity between retinitis punctata albescens and retinitis pigmentosa, both as regards the hereditary transmission, the onset in childhood, atrophy of the retinal elements, the night blindness, and the marked contraction of the visual field. Similar symptoms were noted by him in the peculiar condition which he called *atrophia gyrata choroideæ et retinæ*. Wernicke[20] and others have reported typical cases of the latter disease and the fields showed concentric contraction. Galezowski,[21] however, has reported three cases of retinitis punctata albescens—all high myopes— in which there was no night blindness and no contraction of the visual field.

In ordinary cases of retinitis punctata albescens, such as those reported by Fuchs[19], Galezowski[22], Byers[23], Wustefield[24], Qurin[25], and others, marked retraction of the field of vision is a noticeable feature when the examination is made in a feeble light but there is little or no contraction when the test is made in strong light. The same remark applies to cases of *hereditary congenital night blindness* without ophthalmoscopic changes, such as have been described by Nettleship[26], Sinclair[27], and others.

Bordley[28] has reported some cases of congenital hemeralopia in which progressive night blindness was associated with defect of the lower temporal quadrant of each field, and general and progressive concentric contraction which was greatly increased in diminished illumination.

In cases of *night blindness associated with xerosis of the conjunctiva* Stephenson[29] found two kinds of alterations in the visual fields:—first, a general contraction for white, and, secondly, a contraction for red and green, with transposition of their relative zones. Hepburn's[30] investigations into these cases showed neither ring scotoma nor contraction of the peripheral field.

As compared with the fields in pigmentary degeneration of the retina, Ole Bull[31] gives the following as the main characteristics of the fields in cases of *acute specific choroiditis*:—1. The scotomata are of different shapes and sizes, and originate from the blind spot; and 2. They may assume a ring formation, although not necessarily so. 3. The scotomata are constantly altering even in a few days, and, in the course of a week or two, especially under treatment, may completely disappear. 4. The association of the scotomata with other subjective symptoms, *e.g.*, micropsia, metamorphopsia, etc."

(*To be continued.*)

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TRANSLATION.

GUIDE TO THE MICROSCOPIC EXAMINATION OF THE EYE.

BY

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TRANSLATED FROM THE THIRD GERMAN EDITION

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I. General Part.

EQUIPMENT.

THE equipment of a small laboratory suitable for the microscopic examination of the eye does not, as is often supposed, involve great trouble or expense. The oculist finds his chief work in the practice of his profession, but it is a matter for regret if he confines his attention to this solely. The organ with which he deals is so small that he ought to embrace every opportunity of becoming acquainted with its finer microscopic structure, and thus be able by anatomical examination to demonstrate the necessity for the operative treatment he may have undertaken.

It is impossible for every one to become an expert in staining methods, and in many cases the results attained must fall short of those of the professional pathologist. The aim of this work, however, is to show that a satisfactory examination of an eye can be made without elaborate instruments or numerous re-agents. On the other hand, slavish adherence to a single method is reprehensible. The greatest sinners in this respect are our supermodern *confrères*, who rush to what is newest, who recognise nothing but this, and who scoff to-day at what a year ago they were wont to laud as best. It is much better to learn a few methods of staining thoroughly, and then to study the tissues themselves rather than waste time over non-essential details. Each works best with the agents most familiar to him. This is a secret which, if known, would settle many a dispute.

Microscope.—In the first place a trustworthy microscope is essential, and in the choice of this excessive economy as well as excessive extravagence should be avoided. It may not be convenient to purchase everything at once, but a good stand should in any case be chosen—one capable of having fitted to it all that is eventually necessary. Good work can be done without an oil-immersion lens, and this can be procured subsequently. The favourite instruments (in Germany) are those of Zeiss and Leitz. The Zeiss microscopes are the more expensive; the author has found those of Leitz equally satisfactory if the lenses are carefully selected. When expense is a consideration, Leitz's stand IIb may be procured. This stand can be inclined at different angles, and is provided with an Abbé condenser, an iris diaphragm, and a nose-piece for three objectives. The most suitable eye pieces are No. I. (40 mm.) and No. III. (30 mm.); the most suitable objectives, No. 3 (13 mm.) and No. 6 (4.4 mm.). Such an instrument costs £7 or £8. A good oil-immersion lens, $\frac{1}{12}$ (2.1 mm.), costs £5 more. A micrometer eye-piece is useful for the exact measurement of objects. Excellent instruments are sold by Beck, Swift, Watson, and Powell and Leland, of London.

Microtomes.—A microtome is also necessary, and this should be simple in construction. Complicated instruments are expensive, and are more difficult to keep clean. A good knife and careful imbedding are the main requisites for the production of thin sections. Microtomes, of which there are numerous models, are usually so constructed that the knife is moved horizontally on a slide backwards and forwards, the object being fixed during cutting, and being elevated after each stroke through a distance which corresponds to the thickness of the section desired. The elevation of the specimen is accomplished in one of two fashions. Either the object-holder is raised by being advanced along an inclined plane, or, and this is, in the opinion of the author, preferable, the holder is directly elevated by means of a micrometer-screw. The simple microtome manufactured by Schanze of Leipzig can be recommended. It costs about £5.

If examinations have to be undertaken with the object of establishing an immediate diagnosis, a *freezing apparatus* is indispensable, and every microtome should admit of being fitted with this.

The ordinary *slide* is too narrow. A convenient size is that measuring 32 by 62 mm. *Cover-glasses*, 20 sq. mm., are employed for smaller sections; and those, 25 sq. mm., for sections of the complete bulb.

The mounted specimens should be kept in simple *cardboard cases*, and should be placed horizontally to prevent the Canada balsam from running.

With the aid of a set of *scales* the commoner staining solutions can be produced at small cost. A milligramme of error is of no consequence. Reliable stains can be obtained in powder from the laboratory of Dr. G. Grübler, Leipzig. Solutions which are difficult to prepare should be procured ready for use.

When the tissue is to be imbedded in paraffin an *incubator* is required, and this, as will be shown hereafter, can be utilised for other purposes.

Lastly, there should be provided a broad section-lifter, scissors, two teasing-needles, a platinum needle, a graduated cylinder for measuring liquids, and several shallow vessels of different sizes. These last ought to have flat bottoms, so that they are not easily upset.

Drawing Apparatus.—Some form of drawing apparatus is useful, not only for those who have no talent for drawing, since by means of it errors in shape and relative size are avoided. Till lately Abbé's drawing camera was the best device. The drawing-surface, which is placed at the level of the stage, is

reflected by a mirror and double prism situated above the eye-piece. The image formed by the objective is seen through an aperture in the silvering of the prism. Still more convenient is Leitz's drawing eye-piece. This consists of a prism attached to an eye-piece. The upper part of the microscope is inclined 45°, and the surface of the table behind the microscope is reflected to the eye by two total reflections at the surfaces of the prism. A special drawing table is thus unnecessary.

The two instruments just mentioned are adapted for the drawing of microscopic sections. For projection and for the drawing of large specimens, such as sections of the complete bulb, Edinger's apparatus can be highly recommended. It projects the image of the preparation directly on to the drawing-surface, so that it is visible to the by-standers. The apparatus is, therefore, suitable for the demonstration of specimens.

Edinger's instrument has been adapted for photographic purposes by Nieser. The maker is E. Leitz.

On Procuring Material.

Difficulty is often experienced in procuring material. Eyes removed from the living subject furnish the most suitable tissues for anatomical and pathological research. It is important when the topographical relations of the parts are to be studied that the eye be hardened, and it should be transferred at once to the hardening medium, since a few seconds after removal diffusion of the intraocular fluids sets in, and the corneal epithelium begins to dry. The diseases to which the eye is subject do not, as a rule, necessitate enucleation; and, moreover, in these times treatment is becoming more and more conservative. Further, eye diseases rarely prove directly fatal. As a consequence, many diseases escape pathological examination; indeed, there are numerous affections which are well known clinically, but which have never been submitted to anatomical investigation.

Still greater difficulties are experienced in procuring normal specimens of the human eyeball. Eyes taken from the dead body have undergone changes which render them unsuited for minute examination. The most valuable material for this purpose has hitherto been furnished by eyes enucleated on account of small tumours, for in these the greater portion of the globe may be quite normal. Occasionally, a healthy bulb is removed by the surgeon in resection of the upper jaw.

Both opportunity and resource are required in obtaining from the dead body organs exhibiting pathological processes; and these, when procured, are more serviceable for the study of pathological changes than for that of normal histology. Pathologists, unfortunately, do not always take into account the disadvantages under which ophthalmologists rest, and often give with a grudge material which is of little value to themselves. Those anxious to obtain such specimens should be constant in attendance in wards devoted to general diseases and to affections of the nervous system; and should there examine the patients, and study the ophthalmoscopic appearances of the eyes. Special attention should be paid to cases which are likely to have a fatal termination. In this way changes are often discovered in the eye which are the result of the general disease and also accidental conditions, such as anomalies of refraction, which are of interest and value when so studied.

But even after such discoveries are made, it is difficult to obtain the organs at the conclusion of the *post-mortem* examination. The removal of the eye produces disfigurement which should be avoided. There are several ways of averting this.

When as is often the case, only the posterior portion of the globe is desired

for examination, the following procedure is adopted.—The brain having been removed, access to the eye is obtained by breaking in the roof of the orbit in front of the optic foramen. The splinters of bone are picked away, and one blade of the scissors is pushed into the bulb, which is then completely divided along its equator, the optic nerve being meanwhile held by means of forceps. The scissors should cut deeply, so as to include and to sever the retina, and not tear it from its attachment at the optic papilla, an accident which may occur in unskilful hands. The anterior portion of the globe thus remains *in situ*, and if, after removal of the posterior hemisphere, the cavity of the orbit is stuffed with cotton wool, inspection from the front fails to disclose the slightest disfigurement.

When the brain has not been examined, the removal of the fundus is somewhat more difficult. The method then employed is as follows :—The eye is enucleated *in toto*, divided in the manner just described, and, the space behind the lens having been firmly packed with wool, the anterior segment is replaced. From without the wool is invisible, and the reposition can be effected so as to leave no trace of disturbance.

Should the entire bulb be required, one of two devices may be adopted. After enucleation, the orbit is packed and the eyelids are closed by a stitch inserted at the inner canthus ; or, preferably, an artificial eye is introduced. Artificial eyes should form part of the equipment of every *post-mortem* theatre.

The bulb having been procured, a thread is passed through the end of the optic nerve or through the stump of a muscle, and the specimen is suspended in a vessel containing a plentiful supply of Müller's or other suitable hardening fluid. The liquid is absorbed and the globe quickly resumes its spherical shape. Or, otherwise, the floor of the vessel is covered with cotton wool to prevent flattening when the eye is soft. It is a good rule to suspend the eyeball by a thread passed through the tendon of the superior oblique muscle. Blood, pus, and matter capable of sedimentation are then found in their proper topographical positions.

When it is of importance to retain the shape of the eyeball, the fixing fluid is injected into the vitreous. The needle of the syringe should be very sharp, and should penetrate the sclera obliquely. The syringe is then elevated, and the fluid injected into the centre of the vitreous. The retina and choroid are thus preserved in their normal position. Zenker's fluid is recommended for this purpose.

If Merkel's fluid is employed, it is unnecessary to resort to injection. In this, even collapsed (*e.g.*, highly myopic) bulbs removed from the dead body recover their normal shape ; but the sclera of such eyeballs should be incised before they are subjected to treatment with Müller's fluid, formalin, or alcohol. Otherwise, the diffusion currents are apt to lead to a second collapse, and to disturbance of the parts.

Orientation of the Eyeball.

It has become customary, for purposes of description, to compare the bulb with the earth, and it would be well if this convention were generally adopted. References based on this comparison exclude those misunderstandings which are apt to arise in anatomical accounts of the direction of planes, etc. The eye is considered to possess an anterior and a posterior pole, and to be divided by the equator into an anterior and a posterior hemisphere. Sections made parallel to the plane of the equator are styled "Equatorial Sections" ; those parallel to the plane of a meridian, "Meridional Sections." In the case of the latter, it is necessary to specify the meridian concerned. When it is

stated that horizontal meridional sections are to be made, or that the eye is to be divided into sections parallel to the horizontal meridian, there can be no mistake. To express the same meaning, others employ the term "Horizontal Axial Sections." Vague terms such as "radial" afford no definite information. This word is unnecessary even in descriptions of the iris (*cf.* Kallius, *Ergebnisse der Anatomie und Entwicklungsgeschichte*, Bd. VIII, 1898).

It is of advantage to know the position the bulb occupied in the orbit before proceeding to divide it. Sections can then be made parallel to the horizontal meridian or in any other direction desired. It is also of importance to know to what part of the eyeball a section belongs, and what part of it is superior, inferior, temporal, and nasal.

It will be shown that it is possible to determine the different planes and axes, even after the eye has been enucleated and hardened. It is, however, preferable to mark the position of the eye in the orbit before enucleation. This can be done simply by touching the upper border of the cornea with nitrate of silver previous to the operation. Or, immediately after the eye has been removed, a thread may be passed through the tendon of the superior rectus muscle.

Examination of Fresh Tissues.

The examination of tissues in the fresh state is at present too little practised. In the case of the eye, more often than in that of any other organ, there is a tendency to omit this examination, and first to harden the healthy or diseased globe; because attempts to divide it previous to hardening are apt to disturb the topographical relations of the parts and to spoil the specimen. Nevertheless, something must be said in favour of examining certain tissues while fresh. The excellent words of Virchow, H. Müller, Sattler, and many others, show how much instruction can be derived from the study of fresh specimens. Many advantages are lost by hardening. A glioma retinæ presents in the hardened and stained preparation a picture quite different from that which it affords in the fresh condition. Every intraocular tumour should be examined in its natural state. Only then can a proper conception of its appearance in the living subject be gained. The individual cells, moreover, reveal their structure better in the recent condition than when hardened, shrunken, and closely packed together. Finally, as in the case of tumours, it is often important to establish a diagnosis immediately after the extirpation or exploratory puncture. The examination must then be made while the tissue is fresh, since the hardening process, even under the most favourable circumstances, occupies several days.

Fresh tissues require some preparation before they can be submitted to microscopic examination.

Division of Fresh Eyeballs. - If internal structures are to be examined in the fresh condition the eyeball must be opened at once. In practice this is by no means easy, since the globe collapses immediately an incision is made. The most suitable method of procedure is as follows:—The eyeball is held between the fingers of the left hand, and a sharp knife is applied to it in the equatorial region, so as to cut through its membranes for a short distance. The globe is now quite soft, and, having been carefully taken up with forceps, it should be placed in a vessel three to four cm. deep containing physiological salt solution, 0·6 per cent. Here it is held with the forceps applied to the margin of the incision, and the division is completed by snipping it with sharp scissors around the equator. If it is undesirable that the freshly opened eye come into contact with liquids, it may be held in a towel during the process. Division of the eye along the equator into an anterior and a posterior half is

preferable, because by this method dislocation of the lens and destruction of the specimen are avoided. If, however, it is desired to cut the bulb along a meridian (into an upper and a lower half), the division should be commenced at the posterior pole, the scissors and forceps carried forward on either side, and the anterior structures (lens, iris, cornea) finally severed by one strong snip. After the removal of the portions required (usually small particles), the hemispheres can be hardened.

Examination of Liquids.—It may be desirable, especially when pathological changes are present, to examine liquids removed from the interior of the eye, *e.g.*, subretinal exudations. These contain an abundance of cells, elements which have suffered fatty degeneration, and often cholestearin crystals. The last can be seen well only in the fresh specimen, since they are dissolved by the hardening solutions. Further, it may be necessary to examine subchoroidal exudations, the vitreous, and vitreous opacities. These are removed from the eye by means of a platinum loop, and a drop of the fluid is transferred to a slide, protected with a cover-glass, and placed under the microscope.

These liquids can also be put up in the form of cover-glass preparations, such as are used in bacteriological examinations.

When the fluid removed from the interior of the eyeball is to be examined for micro-organisms, the spot at which the needle is inserted or the opening incision is made, should be smeared with the galvano-cautery. Otherwise, the specimen is likely to be infected by the xerosis bacillus.

Cover-glass Preparations.—A thin layer of the liquid is taken up and smeared on a cover-glass by means of a platinum loop. After being allowed to dry thoroughly, the glass is drawn slowly three times through the flame of a spirit lamp. Some drops of a staining solution are then transferred to the cover-glass by means of a glass rod, and left there for 1 to 5 minutes. The preparation is next washed in water, and dried on a thick pad of blotting-paper. It is then placed aside until the water has evaporated, and, finally, the cover-glass is mounted on a slide with Canada balsam.

Examination of Tissues.—In the case of soft tissues, *e.g.*, gliomata, it is sufficient to draw the blade of a scalpel over the surface of the tumour, or, still better, over the surface of a section, and to examine what adheres to the blade in some "indifferent" medium. For this purpose there is nothing better than the liquid of the eye itself, aqueous or vitreous. Failing these, 0·6 per cent. salt solution may be employed. The more widely the cell mass is spread out, and the less of it taken, the more instructive is the specimen. Only a drop of the medium should be added; otherwise, the cover-glass does not remain fixed, and the cells exhibit continuous movement.

Teased Preparations.—Tissues of firmer consistence, *e.g.*, sarcomata of the choroid, have generally to be teased before they can be examined microscopically. A very small piece of the tissue should be removed with forceps and scissors, placed on a slide in a drop of an indifferent liquid, and teased into fine shreds by means of two strong needles.

Sometimes the tissue is so resistant that it can be resolved into its constituent elements only after treatment with a *Macerating* or *Dissociating Medium*. To this end the pieces are laid for 24 hours in 30 per cent. alcohol, or for two or three days in a small quantity of Müller's fluid.

Sections.—Hard tissues in the fresh condition may be cut with a sharp knife while held between two pieces of hardened liver. Those accustomed to a double-bladed knife may prefer to employ this. The *freezing microtome* gives very beautiful and very thin sections of tissues which do not fall to pieces when thawed. The tunics of the eye unfortunately do not belong to to this class.

The piece to be sectioned must not be more than 2 mm. to 4 mm. in thickness, or it does not freeze uniformly. It is placed with as smooth a surface as possible upon a metal plate, against the under surface of which an ether spray plays. The spray should not be worked strongly or continuously, but intermittently, so as to give the ether time to evaporate. It is well to keep the preparation pressed lightly against the metal plate by means of a scalpel until it is frozen hard, and the plate should be moistened with water before the tissue is placed on it. The sections are examined in water.

Quite fresh tissues suffer considerably in the freezing and thawing. On the other hand, the freezing microtome produces very beautiful sections of tissues which have been slightly hardened. For this purpose formalin is now recommended. Collen (*Centralblatt für allgem. Pathol. und. path. Anatomie*, 1895, p. 449) advises that the pieces (1 × 0·5 × 0·2 cm. in size) be placed in a 10 per cent. aqueous solution of formalin for two hours before being cut. This method possesses the advantage that the red blood corpuscles are not disintegrated by the freezing and thawing.

The following are the stages in the process :—

1. Sections are made from the frozen tissue.
2. These are placed in 50 per cent. alcohol for three minutes.
3. They are transferred to absolute alcohol for one minute.
4. They are immersed in water for a minute.
5. They are stained in hæmatoxylin for two minutes.
6. They are treated with alcohol (containing, if necessary, 1.5 per cent. hydrochloric acid).
7. They are counter-stained with eosin.
8. They are dehydrated in 95 per cent. alcohol, and then in absolute alcohol.
9. They are cleared in oil, and mounted in Canada balsam.

Tissues removed from Müller's fluid may, after being washed for a short time in water, be cut with the freezing microtome, without being imbedded.

Specimens which have been hardened in spirit must be thoroughly saturated with water. It is well to leave them in water for twenty-four hours, since the tissue does not adhere to the metal plate unless every trace of alcohol has been removed.

The *staining of fresh preparations* is accomplished by placing a drop of the staining solution on the slide at the edge of the cover-glass, the stain being drawn under the glass by means of a piece of blotting-paper applied at the margin opposite the drop.

Hæmatoxylin is not suited for this purpose, and Löffler's methylen blue, or picrocarmine, should be employed.

Methods of Hardening and Fixing.

1. Hardening in Alcohol.

The essence of the hardening process consists in the extraction of water from the tissues, and in the coagulation of the albumen they contain. These changes are brought about with remarkable rapidity by means of alcohol. Hence it follows that loose tissues which contain much water and little albumen shrink greatly in alcohol. The eye is a tissue of this nature. The vitreous, even in a normal eye, contains only a small quantity of albumen, and after the most careful hardening shrinks to a thin layer behind the lens. If, therefore, strong alcohol be employed, the shrinkage is intense; and not only does the vitreous shrink, but also the entire bulb with its protective

membranes. Consequently, entire eyeballs should not be brought directly into alcohol. It is preferable to "fix" the tissues in solutions of certain salts in a manner explained hereafter, and to complete the hardening with alcohol. In cases of tuberculosis and in those where this is suspected, the rule does not apply. The bacilli of tuberculosis and similar diseases (anthrax, leprosy, etc.) stain better when the hardening is accomplished by alcohol from the first. At all events, it should be borne in mind that the staining of tubercle bacilli may not be successful if the tissues have been treated with Müller's fluid.

If, then, alcohol be chosen as the hardening medium it should be employed first in a dilute form, and only gradually be increased in strength. In this method the following is the procedure:—

1. The eye is placed in

Alcohol,	50	per cent.,	for	24 hours.
,,	60	,,	,,	,,
,,	70	,,	,,	,,
,,	75	,,	,,	,,
,,	80	,,	,,	,,
,,	90	,,	,,	,,
,,	95	,,	,,	,,
,,	absolute		,,	,,

2. Section of the eyeball.
3. The parts are again placed in absolute alcohol for one day.
4. They are imbedded in celloidin.

An eyeball, however, that has been so treated is usually considerably distorted.

Alcohol, when employed directly, possesses the further disadvantage of removing the colouring matter of the red blood corpuscles, so that only the "shadows" of these are left.

Small pieces of firm tissue, *e.g.*, portions of a tumour or segments of the the optic nerve, may be hardened without injury in alcohol.

Complete eyeballs can be fixed in absolute alcohol if the following device is adopted.—A narrow tube, about 10 inches long, has one end attached to a glass funnel, and its other end to the needle of a hypodermic syringe. The funnel and tube are then filled with absolute alcohol, and the needle is pushed through the sclera to the centre of the vitreous. The funnel is now fixed to a stand at a level which allows the bulb just to touch the bottom of the vessel in which it lies. This vessel is covered as closely as possible. After the alcohol has been allowed to flow into the eyeball for a half to one hour, the vessel is filled with alcohol, and 24 hours later, the preparation is ready to be imbedded.

Greatly shrunken eyeballs, which contain no cavity, and those which cannot shrink owing to the presence of ossification of the choroid, may be placed at once in 95 per cent., not absolute, alcohol. The calcareous plates can easily be felt through the sclera.

2. Hardening in Müller's Fluid.

Müller's fluid is much used for fixing the tissues of the eyeball, and is, in many cases, a most suitable medium. It is a favourite practice to place specimens in it which do not require to be examined at once, and which are not to be treated by any special method. It possesses the advantage that tissues hardened in it are adapted for taking up most nerve-stains; it should be used if it is intended to demonstrate the medullary nerve sheaths (Weigert, Pal). On the contrary, it should not be employed for tuberculous tissues, since, after being exposed to it, bacilli do not stain well.

Müller's fluid, by destroying the structure of the nucleus, prevents the demonstration of karyomitosis ; and the almost universal use of this agent hitherto may explain the lack of attention paid to nuclear division in the past. On the other hand, it preserves the colour of the red corpuscles, so that blood in the vessels and extravasations are rendered prominent by their yellow appearance.

Müller's fluid penetrates the tissues deeply. The external form of the bulb is therefore maintained. Still, even when it is used, there is great shrinking of the vitreous, and almost always artificial detachment of the retina.

The practice of incising the bulb before placing it in the fixing fluid is bad, for it causes mutilation of the eye and offers no advantage. This applies in the case of Müller's and almost every other fixing fluid, with the exception, perhaps, of osmic acid, which possesses only slight penetrating power. Clinical experience shows how easily the cornea and sclera are permeated by chemical substances (*e.g.*, atropin) ; experiments teach the same lesson. An eyeball which has lain for even a few minutes in Müller's fluid shows, when cut, that all its membranes have been permeated. The vitreous alone presents difficulty. Incision of the membranes, however, is equally ineffective in producing uniform saturation, and is likely to do more harm than good. Eyes taken from the dead body show how permeable their tunics are, for although greatly collapsed, when placed in Müller's fluid or when suspended in it by a thread, they quickly absorb the liquid and become tense.

The following rules must be observed to obtain thorough fixation of the tissues :—

The eyeball should be placed in the fixing fluid immediately after enucleation, otherwise diffusion outward of its contents begins, rendering it flaccid and destroying its original form (*cf.* Helmholz. *Physiologische Optik.*, 1st edition, p. 6.) The cornea also, being no longer moistened, begins to dry. During fixation an exchange of fluids takes place, those of the eye passing out and Müller's passing in. To accelerate the process and to obtain a satisfactory result an abundance of the hardening medium must be employed. The vessels used should be of such a size as to contain a quantity of liquid equal to at least six or eight times the volume of the eyeball.

For the first four or five days the liquid should be changed daily, in fact till it no longer becomes turbid. Then the specimens can be left undisturbed for a considerable time.

Müller's fluid is easily prepared. It consists of :—

Bichromate of potash	10 to 12.5
Sulphate of soda	5
Distilled water	500

Albuminate of chromium is formed.

The minimum time for hardening an eyeball is six weeks at ordinary temperatures, or fourteen days in an incubator at a temperature of 36° to 40° C.

The vessel containing the eye should be kept in the dark, to prevent the deposition of chromic salts in the tissues.

After fixation is complete the eyeball must lie for several days in running water or in water which is frequently changed. This removes any excess of chromium, which would be injurious to the staining process. But see "Staining of Medullary Sheaths."

The hardening is completed in alcohol gradually increased in strength.

The process is as follows :—

1. Müller's fluid, 6 weeks or longer.
2. Washing in running water, 1-2 days.

3. Hardening in alcohol.

Alcohol, 70 per cent., for 24 hours.
" 80 " " "
" 90 " " "
" 96 " " "
" absolute " " , or better
" 7 days.

4. The eyeball is now divided.
5. The pieces are again placed in absolute alcohol for 24 hours.
6. Imbedding, etc.

Hardening in pure chromic acid ($\frac{1}{3}$ to $\frac{1}{2}$ per cent. aqueous solution) is less to be recommended, since it renders the tissues, especially the retina, very brittle.

(To be continued.)

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—ANATOMY.

Whitnall, S. E.—On a tubercle on the malar bone, and on the lateral attachments of the tarsal plates. *Journ. of Anatomy and Physiology*, Vol. XLV.

Whitnall, of Oxford, directs attention to a small tubercle on the orbital surface of the frontal process of the malar bone, lying just within the orbital margin, which he has found to be present in upwards of 95 per cent. of 2,000 crania examined by him in the course of his researches. It was also present in the skulls of the chimpanzee and gorilla. The tubercle, by the way, may be readily felt in the living subject by placing the end of the finger opposite the outer canthus of the eyelids and feeling the inner surface of the margin of the orbit at this point.

The structures attached to the tubercle are:—(1) the "check" ligament of the rectus lateralis muscle; (2) the lateral extremity of the aponeurosis of the levator palpebræ superioris muscle; (3) the suspensory ligament of the eye (Lockwood); and (4) the lateral extremities of the superior and inferior tarsal plates.

Whitnall summarises his investigations as follows:

1.—The common attachment to the bone of the check ligament of the lateral rectus muscle, the lateral extremity of the suspensory ligament of the eye, the lateral horn of the aponeurosis of the levator palpebræ superioris muscle, and the lateral tarsal ligament is marked by a tubercle situated on the orbital surface of the frontal process of the malar bone, just within the orbital margin, about 11 mm. below the zygomatico-frontal suture and opposite the outer canthus of the eyelids. This tubercle was found present in over 95 per cent. of 2,000 skulls of various races examined. It can be recognised at sight

in many cases, but is best appreciated by the touch, by which means its presence is readily recognised in the living. The degree of development appears to be an individual variation. It might appropriately be termed the "orbital tubercle of the malar bone."

2.—The structure generally described as the lateral palpebral or tarsal ligament (raphe palpebralis lateralis), and as being formed by a thickening of the septum orbitale, joins the skin and orbicularis oculi muscle only at the outer canthus to the lateral orbital margin. Deep, or posterior to the septum, and separated from it by the lateral extremity of the aponeurosis of the levator palpebræ superioris muscle, there is a much more definite tarsal ligament connecting the lateral extremities of the tarsal plates to the above-described tubercle.

TABLE OF SKULLS EXAMINED.

	No. of skulls.	Tubercle absent.
European	500	6 per cent.
Eskimo	42	10 ,,
N. Amer. Indian	182	2 ,,
Ceylon	11	0
Veddah	13	2
Indian and Afghan	122	12 per cent.
Chinese	86	1 ,,
Japanese	21	5 ,,
Burmese	40	5 ,,
Indo-Malay Archip.	83	5 ,,
Andamanese	59	4 ,,
Polynesian	187	8 ,,
Micronesian	9	1
Melanesian	77	4 per cent.
Tasmanian	30	7 ,,
Australian	152	5 ,,
Maori	87	1
W., C., and S. African negro	153	7 per cent.
Hottentot	7	0
Bushmen	17	0
Peruvian	30	0
Patagonian	20	0
Ancient Egyptian	72	15 per cent.
Total	2000	Tubercle absent in 4·5 per cent.
Chimpanzee	21	Absent in 3.
Gorilla	8	Absent in 5.

SYDNEY STEPHENSON.

II.—COMPARATIVE PHYSIOLOGY.

1 von Pflugk.—The accommodation of the aphalopoda and fishes. Die Akkomodation der Aphalopoden und Fische.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

2 Fujita, H.—Movement of the pigment and contraction of the cones in response to various stimuli in the dark-adapted eye of the frog. (Pigmentbewewung und Zapfenkontraktion in dunkelauge des Frosches bei Einwirkung verschiedener Reize.) *Arch. f. vergleichende Ophthalmologie*, Bd. II, Heft ii, S. 164. 1911.

(1) Researches upon the refraction of octopi have given discordant results. Thus, Beer found that octopi were myopic, Hess found emmetropia, and Heine emmetropia or slight myopia. Beer found that aphalopoda and fishes had negative accommodation; that is to say, they have to adjust the eye for distance. Hess found positive accommodation, and Heine both positive and negative. The difficulties lie in the anatomical structure of the cephalopod eye, which consists chiefly of muscular structure, the so-called Langer's muscle. Such an eye easily loses its shape when fixed. These difficulties can be partially overcome by Faradising the muscles during the process of fixation.

Working at Naples at the Zoological Station, **v. Pflugk**, of Dresden, found that Langer's muscle was the longest in the freshly enucleated eye, shorter in an eye which had been treated with atropine, and shortest of all in the tetanised eye. The corpus epithelie showed by its variation in size marked evidence of contractility, and the author thinks it must be useful in accommodation. He confirmed Beer's result as regards the fishes' eye.

T. HARRISON BUTLER.

(2) Since it has been shown by Hess (*vide* THE OPHTHALMOSCOPE, Vol. IX, p. 191, 1911) that the contraction of the cones and wandering of the pigment in the epithelium may vary not only with light- or dark-adaptation, but also regionally, in the retina of the same eye, it has become necessary to revise the work done on this subject, with due precautions against the sources of error thus introduced.

A contribution to this revision is made by **Fujita**, of Japan, who was careful to examine the same part of the retina (the area centralis) in all his cases. His results, briefly, are as follows.—Under the influence of light, contraction of the cones is a change which occurs more quickly than pigment wandering. Heat causes the cones and pigment to take up the light position; cold has no influence. In contravention of the statement of other authors, strychnine does not cause the light position, nor does it delay dark adaptation; quinine also has no effect. Adrenalin gives the light position. It has been maintained that the light position may be induced by illuminating the hinder half of the frog only, or one eye only, the head, or the other eye, being covered; this observation is not confirmed by Fujita, provided that sufficient care be taken that no light reaches the eye either under the covering cloth or through the tissues. A partial change from dark position to light position may occur in the excised eye exposed to light, so that any delay in fixation may give deceptive results; on the other hand, there is no change from light position to dark position in an eye excised in the light and placed in the dark room. Electrical stimulation produces no result in the dark-adapted frog, but in the light-adapted causes slight retraction of pigment.

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When using a magnifier (corneal or otherwise) it is often troublesome to get sufficient light, owing to the extremely short working distance. By the sacrifice of a small percentage of the field of view we have been able to overcome this trouble. Magnifiers may now be obtained having a working distance of 3″ for a power of +10 and 5″ for a power of +5. Other powers have correspondingly long working distances. Many uses will suggest themselves at once for this novel type of magnifier, the prices of which are very reasonable.

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is being made by us of complete outfits for Colonial work. They are arranged to suit various conditions and the prices are in all cases as low as possible consistent with good workmanship and accuracy. It is a considerable advantage, where possible, to purchase a complete outfit in this manner, as the work and finish is thus of standard style and quality. We shall be pleased to send particulars and prices.

We have been appointed makers of Mr. Doyne's ophthalmic lamp bracket and stand. This was originally made for the Oxford Eye Hospital and is one of the most simple and effective pieces of apparatus made.

In addition to our own large field ophthalmoscope we have now the Thörner hand ophthalmoscope the general principles of which are as follow :

The source of light is a 6-volt single filament lamp which is focussed by a concave mirror on to the cornea, and passing through illuminates a large area of the retina. The viewing apparatus consists of a series of three convex lenses, two of which act in a manner similar to that of the field lens of a terrestrial telescope, and the third, which is adjustable for position, acts as an eye-piece. By means of a clever arrangement of protecting shades corneal images are prevented from reaching the observer. To further facilitate the use of the instrument means are provided so that in one position the cornea is visible with the image of the lamp formed on it indicating the correct direction of the illumination—and above or below, depending upon the eye under observation, the fundus is seen. Different portions of the retina may be observed by directing the patient to a small red fixation spot, or other position, as may be required. The field of the instrument is equivalent to 4 diameters of the normal disc, and the magnification is that of the direct method. In outward appearance the instrument consists of a well-finished aluminium box, about 6 inches long, and $2\frac{1}{2}$ by $1\frac{1}{2}$ inches.

We shall be pleased to demonstrate this instrument upon request.

III.—BACTERIOLOGY.

(1) **Pagenstecher, H. E., and Wissmann, R.—On metastatic ophthalmitis due to Gram-negative cocci differing from Weichselbaum's meningococcus.** (Ueber metastatische Panophthalmia durch Gram-negative Kokken, die mit den Weichselbaumschen Meningokokken nicht identisch sind.) *Klin. Monatsbl. f. Augenheilkunde*, April, 1911.

(2) **Pagenstecher, Hermann E.—On corneal infection due to bacillus pyocyaneus.** (Ueber Hornhautinfection durch Bacillus pyocyaneus.) v. Graefe's *Archiv für Ophthalmologie*, Bd. LXXIX, Heft i, April 11, 1911.

(1) The genuine meningococcus (Weichselbaum's) has been frequently determined as the cause of metastatic ophthalmitis in cases of epidemic cerebrospinal meningitis. The latter disease, however, is sometimes due to cocci which are nearly related to, but not identical with, the meningococcus. That such atypical meningococci may give rise to metastatic ophthalmitis is proved by the case related by **Pagenstecher** and **Wissmann**.—The left eye of a child, aged five months, was enucleated on account of beginning purulent panophthalmitis. There was slight fever, and the mother reported that the child had lately been stiff several times, with the head retracted. All signs of general illness disappeared immediately after the removal of the eye. The vitreous was converted into pus. Films showed Gram-negative diplococci in pure culture; cultural, fermentation, and agglutination tests proved the organisms to be not identical with typical meningococci. The pathological examination of the eye showed the presence of cocci in the choroid, apart from the vitreous. No coccal embolism was found in the retinal vessels, the retina altogether being much less inflamed than the uvea. Particularly striking was an enormous development of connective tissue in the region of the ciliary body, which led to a displacement and deformity of the lens. The choroid, not the retina, was evidently the primary seat of metastasis. C. MARKUS.

(2) **Pagenstecher** (Strassburg, i. E.)—The corneal infection was due to an abrasion with part of a bulrush in a child of five years, and took a very unfavourable course, necessitating excision. What seemed to be bacillus fluorescens was found in the cultures, together with staphylococcus pyogenes albus and cocci; both these latter proved non-pathogenic. Now, bacillus fluorescens has never hitherto proved pathogenic for the human eye; but careful and protracted cultivations finally led to the demonstration of pyocyanine in the cultures, thus clearing up the pathology of the infection, and showing that the bacillus was really the bacillus pyocyaneus, infection with which takes a most rapid and unfavourable course. R. GRUBER.

IV.—LESIONS OF THE OPTIC CHIASMA.

Fisher, J. Herbert.—The pituitary body and lesions of the optic chiasma. *Trans. Ophthal. Society U.K.*, Vol. XXXI, Fasc. 2, 1911, p. 51. Ref. *Medical Press and Circular*, 27th September, 1911.

Fisher, of London, has an exhaustive paper on this subject. The development of the ductless gland as two originally distinct lobes—the

posterior from the floor of the third ventricle, and the anterior from Rathke's pouch as a diverticulum from the stomodœum is thoroughly explained. The pars intermedia, which is merely a backward extension of the anterior lobe which encircles the stalk of the posterior lobe, is said to secrete a colloid material which probably reaches the third ventricle *via* the infundibulum. This colloid substance differs from the colloid of the thyroid in that it is devoid of iodine. This fact has lead Fisher to the conclusion that hyperactivity of one of these glands cannot compensate for inactivity of the other in diseased conditions. In this connection we would suggest that in all probability the enlargement of the thyroid which accompanies some diseases of the pituitary body may be attributable to the same cause as induced the changes in the hypophysis, and that it is in no sense a compensatory hypertrophy. The therapeutic effect of the extracts of the posterior lobe closely resemble adrenalin in raising blood pressure, promoting diuresis and dilating the pupils. Paulesco and Cushing have shown that partial removal of the anterior lobe results in a state of adiposity, sexual infantilism, polyuria, sub-normal temperature, œdema of skin, alopecia, and general hebetude. Total removal is fatal. Cushing attributes acromegaly to hypersecretion of the hopophysis, whereas adiposity and sexual infantilism of Fröhlich are said to be due to insufficiency of secretion, which in the majority of cases is caused by the pressure of a tumour on the pituitary body. Fisher gives the notes of nine cases in which the involvement of the optic chiasma by pituitary tumour with erosion of the sella turcica gave the following signs and symptoms:—(1) Bitemporal hemianopia; (2) primary optic atrophy; (3) failure of sexual functions; (4) headache; (5) drowsiness. Fisher advocates treatment by organo-therapy employing both thyroid and pituitary extract. Armour's extract of the anterior lobe of the pituitary is said by Cushing to be the only rational method of treatment other than operation for the removal of neoplasms, the results of which have previously been far from encouraging. There appears to be no foundation for the view put forward by Fisher that the pituitary gland undergoes a pure hypertrophy in acromegaly in order to supply the demands of the economy for an increased secretion. On the contrary, the writer substitutes cause for effect; for it is highly probable that acromegaly is due to excessive production of a pathological secretion which differs in some respects from the normal pituitary secretion. It is, moreover, possible by this latter view to explain the beneficial effect of administering extracts of pituitary gland in cases of acromegaly as well as in cases of Fröhlich's disease, in which the adiposity, sleepiness and sexual infantilism are assumed to be due to diminished secretion.

While offering these criticisms on the conclusions which Fisher has deduced from observations of his series of cases and the marked improvement of treatment with thyroid and pituitary extract, we appreciate the labour which he has bestowed upon his investigations, particularly with reference to the examination of the fields of vision, which he has found of great diagnostic importance in the detection of obscure early cases of acromegaly associated with eye symptoms. T. O. G.

V.—THE SCHIÖTZ TONOMETER.

Heilbrun, Kurt. — On the results hitherto obtained with the tonometer of Schiötz (according to experiences of his own and of others). (Ueber bisher mit dem Schiotz'schen Tonometer erziete Resultate [nach eigenen und fumden Untersuchungen].) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXIX, Heft ii, 30 Mai, 1911.

Heilbrun insists upon the great importance of carefully determining the intraocular pressure with Schiötz's tonometer, the mere tactile method being very misleading and of no real value. The mercurial equivalent of the intraocular pressure varies greatly in different normal eyes—between 12 mm. and 27 mm. according to Heilbrun—but though varying in the same eye at different times, it seems to be equal in the two healthy eyes of the same individual. Any pressure above 30 mm. of Hg. must be considered as pathological. Errors of refraction do not cause any change in the tonic value. Cocaine diminishes it slightly in normal eyes, but raises it in glaucomatous eyes, while atropine, although of course increasing it in the latter, hardly affects it in the former. Subconjunctival saline injections always increase the pressure in hypotonic eyes. After operations for cataract, the normal tension returns after a few weeks, but not within a fortnight. Detachment of the retina does not always cause diminution, and in intraocular tumours very often there is no increase of pressure, thus shaking one of our preconceived diagnostic points. Heilbrun's conclusions with regard to the importance of the tonometer in glaucoma are most important. He does not think that there is any case—including so called "glaucoma simplex"—where the tension is not increased at least *at times*, and in any event it may be that the tension which we find might already be a considerable increase on the condition of health, which might have been one of relatively low pressure. The application of the test is particularly important, where the other eye has been affected, and where a slight increase often precedes other symptoms. With regard to the treatment of glaucoma by drugs, the hardening action of cocaine has been mentioned before; this should exclude the employment of Wicherkiewicz's method of combining cocaine with pilocarpine and eserine. Holocaine, on the other hand, does not affect the tension. Pilocarpine (2 per cent.) acts less vigorously but more regularly than eserine (half per cent.), and is sometimes effective where eserine fails and *vice versa*. R. GRUBER.

VI—HERBERT'S "SMALL FLAP" SCLEROTOMY.

Herbert, H.—Interim report on the "small flap" sclerotomy. *Trans. Ophthal. Society U.K.*, Vol. XXXI, Fasc. 3, p. 202, 1911.

Herbert, of Nottingham, presents an interim report dealing with the *technique* and results of his "small flap" sclerotomy in cases of glaucoma. He has performed the operation upon fifty-four occasions for glaucoma, primary and secondary, and these cases form the basis of the present report. Of the total number, thirteen were done with the help of Harman's "twin scissors" (see p. 802 of the present issue of THE OPHTHALMOSCOPE), and the others, forty-one in number, with knives alone. As regards the last-named, there were three failures, one in a case of acute glaucoma in an eye already

blinded by the glaucoma simplex, and two in cases of secondary glaucoma. The possible causes of failure are fully and candidly discussed by the author. As to the thirteen operations with the "twin scissors," Herbert intends "to wait and see more of the results before operating again by this method."

Herbert's communication gave rise to an important discussion.—**Tomlinson**, of London, showed a good result from the operation in a glaucomatous patient, aged 22 years. **E. Treacher Collins**, of London, had performed the operation forty times since it was originally described by Herbert. There was usually a satisfactory reduction in tension, but there had been some failures. In explanation of the action of the procedure, Collins suggested that it probably produced a permanent gap in the endothelium which lined the periphery of the cornea, thereby allowing the aqueous to filter into the corneal substance at the limbus and to become absorbed by the vascular loops present in that situation or to cause some œdema in the overlying conjunctiva. The failure of the endothelium to cover the wound would probably be helped by a considerable retraction of the edges of the opening made through Descemet's membrane. **Mayou**, of London, had experienced two failures in fifteen operations by Herbert's method. Both were instances of chronic glaucoma. **Laws**, of Nottingham, had experienced no bad result among the forty-five operations he had performed by the method. **Ridley**, of Leicester, had, with a couple of exceptions, obtained "very considerable improvement" in the twenty-two operations he had performed

SYDNEY STEPHENSON.

VII—THE FERGUS-ELLIOT OPERATION FOR GLAUCOMA.*

(1) **Young.—Trephining for glaucoma.** *Ophthalmic Record*, September, 1910.

(2) **Elliot, R. H.—The operation of simple trephining of the sclera for the relief of glaucoma.** *Ophthalmology*, April, 1911.

(3) **Walker, A. Nimmo.—Sclero-corneal trephining for glaucoma.** *Liverpool Medico-Chirurgical Journal*, July, 1911.

(4) **Clegg, Gray.—Observations on trephining the sclera.** *Lancet*, August 5th, 1911, p. 381.

(5) **Elliot, R. H.—Some technical details of the operation of simple trephining.** *Trans. Ophthal. Society U.K.*, Vol. XXXI, Fasc. 3, p. 230, 1911.

(6) **Stephenson, Sydney,—Notes on a case of acute glaucoma successfully treated by the operation of trephining the sclera.** *Lancet*, October 21st, 1911.

(1) **Young**, of New York, uses a 2 mm. trephine, with a cutting edge 1 mm. long, having a sliding collar, which can be fixed, so that the trephine can only cut a certain depth, *e.g.*, 1 mm. A short screw thread at the other end of the knife takes a perforated nut which acts as a handle. The whole instrument is 35 mm. long. After reflecting the conjunctival flap, he passes a silk stitch through the episcleral tissue at the point which is to be the centre of the disc to be removed—including only as much tissue as can comfortably be surrounded by the calibre of the trephine. The needle

*This operation was first described in the columns of THE OPHTHALMOSCOPE, in December, 1909. Subsequent communications on the subject by Elliot may be found in the following numbers:—July, 1910; November, 1910; June, 1911; August, 1911.

is then removed from the thread, the two ends of which are twisted together and threaded through the trephine from the cutting end outwards. The threads are put on the stretch with one hand, and the trephine is used with the other. While cutting, the thread not only fixes the eye but pulls the sclera, where it is to be cut, well up against the trephine and affords a firm base for cutting, and when the disc has been cut, it comes away at the end of the thread through the trephine, like a cork out of a bottle. He sharpens the trephine by using a cylindrical piece of horse-hide strop which fits the trephine rather tightly and is tapered at one end for easy threading from the nut towards the cutting end of the instrument. By pulling the strop through the trephine two or three times, the edge keeps as keen as a razor. He cleans the trephine with pipe cleaners dipped in olive oil or water, and it is dried by passing a pipe cleaner, dipped in ether, through the instrument a few times. J. JAMESON EVANS.

(2) The paper gives the details of **Elliot's** operation, as they have already been presented to readers of THE OPHTHALMOSCOPE. One or two special points may be referred to.—Having tried the different sizes of trephine, he now concludes that the best results are obtained with one of 1.5 mm. diameter, 2 mm. being also a useful size. On one or two occasions, when a 1 mm. trephine was used, the disc of sclera escaped into the anterior chamber, and had to be removed by irrigation and the use of forceps. If the iris presents in the wound, it is snipped with scissors in a radial direction; and if it does not then return, the prolapsed portion is excised. The conjunctival flap, as a rule, is not sutured. On the third day after operation, atropine is instilled, to guard against the formation of synechiæ, sometimes caused by a quiet form of iritis in congestive cases. The results, as ascertained in cases which have returned for examination, are proving satisfactory. Maintained or improving vision has been found in cases returning as long as fifteen months from the date of operation. A. J. BALLANTYNE.

(3) **Walker**, of Liverpool, considers that the operation of trephining the sclera is more difficult than might appear from the description. These alleged difficulties have induced him to employ a mechanical trephine for the operation. For this purpose he has fitted von Hippel's trephine with 1mm., 1.5 mm., and 2 mm. blades, and has further shortened the shaft, so that the surgeon can steady his hand by resting his little finger upon the patient's forehead. After having dissected up as far as possible with scissors the conjunctival flap, Walker continues the dissection with a fine blade. He thus penetrates right into the cornea, so that the flap may be said to have its base in the superficial layers of the last-named structure. Moreover, if the tension of the eyeball be high, he passes the point of the knife into the anterior chamber, and allows the aqueous humour to escape very slowly until the pressure is considerably reduced. Under these circumstances, it would be troublesome to cut out a clean disc of sclera with the hand trephine, but no difficulty is experienced when working with the mechanical trephine.

Walker has trephined in eight cases of glaucoma—upon the whole, with favourable results. In the present state of our knowledge, he believes that "this operation holds out the best prospects of success in these cases which, unchecked, progress inevitably to total blindness." SYDNEY STEPHENSON.

(4) **Clegg**, of Manchester, has performed the operation of trephining the sclera twenty-three times with the most satisfactory results. The restoration of V. 6/6 after it had been reduced to "fingers" was not rare. As to complications, there had been no escape of vitreous; prolapse of iris had occurred four times, necessitating iridectomy; there had been secondary bulging of the iris once and of the ciliary body twice. Clegg has tried and

abandoned Gayet's operation, Herbert's "wedge" operation, and Legrange's sclerectomy, and he now looks upon trephining as suitable for all types of primary glaucoma. SYDNEY STEPHENSON.

(5) **Elliot,** of Madras, describes and illustrates certain points in the *technique* of trephining the sclera in glaucoma based upon the experience gained in upwards of four hundred such operations. They are as follows:

1. **The part of the eye to be trephined.**—The operation is best performed above the cornea, since there the wound is less exposed to infection, the iridectomy (if one be done) is concealed by the upper lid, and, finally, the conjunctival flap seldom requires a suture. One exception to the rule is when a patient obstinately looks upward, under which circumstances the trephine should be applied below the cornea. Two other exceptions are enumerated by Elliot, namely, when the upper part of the cornea is involved in a staphyloma, and when it is evident that the anterior chamber is shallower upwards than elsewhere.

2. **Some points about the flap.**—Elliot favours a large conjunctival flap, inasmuch as it is a safeguard against infection, prevents corneal astigmatism, and allows of free and early filtration. The flap he now employs, does not, as did the earlier one, begin and end in the limbus. On the contrary, it now runs concentric with the limbus, and ends on either side some 4mm. below the highest point of the cornea and 4mm. to the inner or outer side, as the case may be, of the limbus. The underlying idea is that even if the line of incision cicatrise all round, fluid from the interior of the eye can still make its exit through the trephine hole into the subconjunctival space. In making the flap, the conjunctiva, as high as possible on the eyeball, is seized with forceps, and one free cut made in the direction in which the flap is to be made followed by a couple of free snips on each side, should suffice to fashion the flap. It is necessary to clear away the subconjunctival tissue to the limbus only in the middle of the wound; to clear the sides would be both unnecessary and disadvantageous. The point of closed scissors is next employed to separate the conjunctiva from the deeper parts up to the limbus. It is most important to expose the limbus properly. The structure in question can be seen through the flap overhanging the neighbouring sclera. In cases exposed to long-continued congestion—*e.g.*, chronic glaucoma—the separation should be continued until the cornea can be seen to be slit, as evidenced by a thin crescent of dark colour surrounding the base of the flap. Indeed, in Elliot's hands, this "splitting of the cornea" has now become a routine practice.

3. **The application of the Trephine.**—The aperture made by the trephine should be placed as far forward as possible. Elliot's preference is toward the simpler forms of trephine, and he favours a cutting crown the diameter of which is 2mm. A groove is first made with the instrument in the sclero-cornea, and that once effected, the blade must be raised from time to time, in order to appreciate the depth of the incision. The moment when the trephine has perforated the sclera is indicated by "a sucking feeling," the escape of aqueous, and often by trifling pain on the part of the patient.

4. **Difficulties.**—The aqueous will escape freely if the anterior chamber has been succesfully entered by the trephine. But there are cases where the aqueous escapes scantily and the anterior chamber remains full. This may be due to one of two causes—first, to the wound being blocked by iris, and, secondly, to a valve-like entrance of the wound into the chamber. In the first contingency we allow the pent-up fluid free escape either by slitting the iris with scissors or by excising the bulging membrane. During the excision, the scissors points are carried right down into the wound and traction upon the iris is most carefully avoided. If aqueous fail to escape through blockage

by iris, the trephine hole may often be freed from obstruction by using the spatula and pushing the impacted iris back, or the irrigator may be employed for the same purpose. In another class of case, the iris base is so widely adherent to the periphery of the cornea that the trephine, passing through the adherent iris, taps not the anterior but the posterior chamber. In these circumstances, although the aqueous escapes with a gush, we find that the anterior chamber is still full of fluid and the eye is still hard. Immediate interference is to be deprecated, for when examined on the following day, the eye is found to be soft. As Elliot remarks: "It is therefore obvious that the channel for filtration has been opened up, even though fluid cannot be pressed through it mechanically; when the posterior chamber is once re-established, the channel of escape of fluid opens of itself." In yet another class of case, even after the anterior chamber has been emptied of aqueous, the eyeball remains hard. The condition is to be ascribed to subchoroidal hæmorrhage. There is then risk of escape of the vitreous humour, and not a moment should be lost in closing the eye.

5. **Anæsthesia.**—The operation is undertaken under the local anæsthesia induced by dropping into the eye cocaine (4%) and adrenaline (1 : 1,000). When an eye is very sensitive, as in cases of acute glaucoma, a subconjunctival injection of ten to fifteen drops of cocaine (1%) and adrenaline (1:4,000) is made in addition to the instillation.

6. **After-management.**—The eye is inspected twenty-four hours after operation, and the anterior chamber is then usually refilled. Filtration is established at once. It is advisable, as a rule, to use atropine within forty-eight hours after the operation, since synechiæ are very apt to form. Should iris prolapse after operation, physostigmine should first be employed, and that failing, the conjunctiva must be thrown back and the iris excised. Elliot has been compelled to adopt this course in 2·5% of 278 operations, with a satisfactory result in each case.

A discussion followed the reading of Elliot's communication, but owing to the press of business at the meeting, two speakers only were accorded a hearing. Both speakers (**Stephenson**, of London, and **T. Harrison Butler**, of Leamington) spoke of the possibility of leaving the fragment of excised sclera in the anterior chamber, but Elliot "did not see why leaving an aseptic piece should produce reaction." SYDNEY STEPHENSON.

(6) **Stephenson,** of London, reports a case of acute bilateral glaucoma in a woman of 67 years. The condition had lasted upwards of a month, and the sight of the right eye was reduced to perception of light and that of the left eye to 5/60. Under general anæsthesia, both eyes were trephined according to the plan described by Major Elliot, I.M.S. Fifty days after operation, R.V. 6/9 and L.V. 6/24. It should be added that the relatively poor visual result obtained in the case of the left eye was due to the fact that the eye was amblyopic from squint in childhood.

VIII.—NEW INSTRUMENTS.

(1) **Bardsley, P. C.—A new needle holder.** *Ophthalmic Review*, March, 1909.

(2) **Smith, Priestley.—A new simple ophthalmoscope.** *Ophthalmic Review*, February, 1910.

(3) Kauffmann.—On Dr. Precerutti's new apparatus for the removal of foreign bodies from the eye. (Ueber einen neuen Apparat des Dr. Precerutti zur Entfernung ven Fremdkörpern aus dem Auge.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 19 Mai, 1910.

(4) Lafon, Ch.—Modification of Desmarres' chalazion forceps. (Modifications à la pince chalazion de Desmarres.) *Recueil d'Ophtalmologie*, aôut, 1910.

(5) Ohm, Joh.—A modification of tattoo instruments. (Eine Modifikation des Tätowier-Instrumentes.) *Centralbl. f. prak. Augenheilk.*, September, 1910.

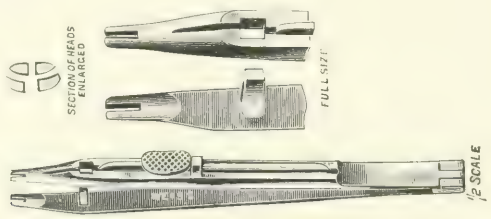
(6) Frieberg, T.—A new instrument to produce permanent drainage of the tear passages. (Ein neues Instrument zur Herbeifuhrung permanenter Drainage der Thränenabflusswege.) von Graefe's *Archiv für Ophthalmologie*, Bd. LXXVII, 1 Heft, Oktober 11, 1910.

(7) Ewing, A. E.—A keratome and a fixation forceps for cataract extraction. *American Journal of Ophthalmology*, March, 1911.

(8) Harman, N. Bishop.—Twin scissors for sclerotomy. (Herbert's operation.) *Trans. Ophthal. Society U.K.*, Vol. XXXI, Fasc. 1, 1911, p. 36.

(9) Dorrell, E. A.—A paracentesis needle for the preparation of vaccines from the aqueous. *Trans. Ophth. Society U.K.*, Vol. XXXI., Fasc. 2, p. 49, 1911.

(1) This instrument, by **Bardsley,** of London, is intended to hold small curved needles securely without danger of breaking. It is made in three pieces, easily detached for purposes of sterilization. It has a two-point grip,



and the upper blades are concave and slightly closer together than the lower, which are convex. The hold on the needle is by a graduated cone clutch, so that it is easily adjusted. A. H. Payan Dawnay.

(2) This ophthalmoscope, designed by **P. Smith,** of Birmingham, consists of a flat handle carrying a mirror at either end: one plane, the other condensing but not concave. A socket is placed behind each to take a lens from a trial case. It can be used for the shadow test, examination of the media, or the indirect method. The mirrors are not perforated, so that no confusion arises from a tunnel: the silver backing is protected from scratching by a disc of glass cemented on the back with balsam. The condensing mirror is made of a plano-convex lens, the plane surface of which is silvered, then blackened, and a small central area cleared, and, finally, a disc of glass is cemented on the plane surface. The result is a condensing mirror of 25cm. focal length, and the user has a lens of +2D. before his eye, a convenience to the presbyope. Similar mirrors can be made of different focal lengths by using a plano-convex or plano-concave lens instead of the flat protecting glass. A. H. Payan Dawnay.

(3) **Kauffmann** describes Precerutti's apparatus shaped like a shell which can be closely applied to the eye, and has on its internal surface a

speculum for keeping the eyelids open. A tubule at the outer angle with an india-rubber tube attached permits a current of air to be blown through the eye. The inventor hopes to be able to remove foreign particles from the eye in the same way as the barber removes "scurf" from the head. The breath is not aseptic, and the use of the same mouthpiece by different persons is scarcely clean; there should be an air bag. The inventor seems to consider the small instrument useful for travelling, and for the lay public. It is improbable that the professional attendant will trust to such a haphazard method. The apparatus can be obtained only from the inventor, Dr. G. L. Precerutti, Torino, Via Sa Chiara, 20. W. B. INGLIS POLLOCK.

(4) **Lafon's** modifications consist in making the blades stirrup-shaped with the upper borders concave, so as to fit that of the globe when the lid is turned over. The curvature on the flat is contrary to that of the ordinary form, being convex outwards on the solid blade and concave outwards on the fenestrated blade. The fixing screw is on the side of the solid blade. The size of the fenestration is 15 mm. by 13 mm., and the length of the male screw is 11 mm. J. JAMESON EVANS.

(5) **Ohm** has adapted an instrument which is used for massage for the purpose of tattooing the cornea. An ordinary electrical vibrator is the instrument and its massage head is replaced by a bundle of needles, two or four. The extent of the excursion is about $\frac{1}{2}$mm., and this can be regulated by means of a screw, and its frequency is about 2,000 a minute. By using such an instrument, tattooing the cornea can be done rapidly, thoroughly, and exactly; and with a normal thickness of the cornea, there is no danger of going too deep. A. LEVY.

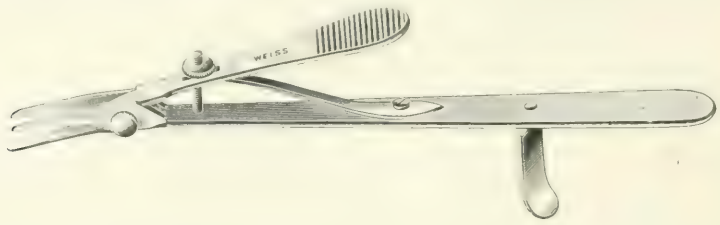
(6) This is a modification of Koster's method. The instrument is a hollow probe of about two inches in length, within which a very thin steel spring plays; the length of this latter is about four inches and it ends in a round button which projects beyond the opening of the hollow tube, while on the other end it forms a loop through which the silk thread is passed. After introducing the armed probe, it is slightly withdrawn, when the spring finds its way out of the nostril by its own elasticity or is easily extracted with forceps. The results of this method are quite as satisfactory as those reported by Koster. R. GRUBER.

(7) **Ewing**, of St. Louis, is a supporter of the method, so strongly advocated by Claiborne, of making the incision for cataract extraction with the keratome. A specially wide keratome is employed. In Ewing's instrument the point is a right angle, and the lateral angles are full twelve or twelve and a half millimetres from one another. In order to gauge the distance to which the blade is to be inserted into the cornea, the back edge or heel of the knife is made with the curve of the sclero-corneal margin. This back edge, to the centre of which the handle is attached, is an arc with a $6\frac{1}{4}$ millimetre radius. 'With this width and a rectangular point, the blade will not touch the cornea opposite to where it is entered in any normal anterior chamber when the heel of the blade reaches the corneal margin, assuming that the incision is made at the sclero-corneal juncture just a little back of the clear cornea, and the position of the blade is maintained in the sclero-corneal plane." For this operation firm fixation of the globe is very essential, and in order to prevent any possibility of rotation, Ewing employs a two-pronged fixation forceps with prongs sufficiently wide to grasp the conjunctiva firmly at either side of the cornea near its corneal attachment, two to three millimetres below the horizontal meridian. There are illustrations of the two instruments.

ERNEST THOMSON.

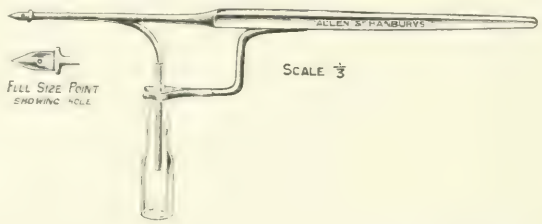
(8) The instrument devised by **Harman,** of London, is intended to be of

service in the performance of Herbert's most recent operation for glaucoma. It is capable, on approximation of the blades, of making two parallel cuts,



each 4 mm. in length, and separated from one another by a distance of 3 mm. It is shown in the figure. The so-called "Twin Scissors" are made by Messrs. John Weiss & Son, of London.* SYDNEY STEPHENSON.

(9) The instrument devised by **Dorrell**, of London, for withdrawing



aqueous from the anterior chamber, is shown in the illustration.

SYDNEY STEPHENSON.

IX.—MYOCLONIC NYSTAGMUS.

Lenoble, E., and Aubineau, E.—Myoclonic nystagmus. (**Le nystagmus-myoclonie.**) *Revue de Médicine*, 10 mars, 1911.

In a series of works published during the last nine years **Lenoble** and **Aubineau**, of Brest, have endeavoured to establish the identity of a peculiar grouping of symptoms, a so-called "syndrome," specially common, as it would appear, in the department of lower Brittany, France. The condition is one of nystagmus, often affecting several generations of a family, and associated in many cases with spasmodic movements of the head or body, quivering of muscles of the limbs, exaggeration of the knee-jerks, vaso-motor disturbances, and congenital dystrophies. Stigmata of degeneration are by no means rare. Psychical disturbances may be present. The authors, relying upon the frequent co-existence with the nystagmus of myoclonic disturbances of muscles in other parts of the body, regard the ocular symptom as a variety of myoclonus, localised chiefly in the musculature of the eyes. Hence they name the condition "myoclonic nystagmus' (*Nystagmus-Myoclonie*).

Lenoble and Aubineau have now observed some new facts regarding the syndrome outlined above, and these they have embodied in the present communication, which also includes an account of two autopsies made upon the bodies of patients affected with the disease.

When nystagmus exists alone (*essential nystagmus*), it is believed by the authors to represent an isolated manifestation of the myoclonic state, or, in other words, to be a mono-symptomatic myoclonus. The familial type of the disease may present modalities in various members of the affected family. For example, some may suffer from nystagmus alone, others from various

*For a description of an improved model, *see p.* 775 of the present issue of THE OPHTHALMOSCOPE. —Editor.

types of myoclonus, and others, again, from psychic disturbances, or signs of degeneration, mental or physical. Thirty-one of the cases related at length by Lenoble and Aubineau are grouped under four heads :—(1) Isolated cases *i.e.*, cases in which the family character of the nystagmus cannot be traced; (2) Familial cases, in which several members of the same family present the syndrome; (3) Cases associated with intellectual disturbances; and (4) Cases in which the nystagmus and the other symptoms improve or even disappear definitively.

Examination of the bodies of a couple of sufferers from myoclonic nystagmus, who succumbed to intercurrent maladies, revealed no lesion of the nervous system competent to explain the symptoms observed during life. Under these circumstances it is, of course, possible that such alterations exist, although it is impossible to discover them with our present methods of exploration. There is, however, another hypothesis, which is favoured by the authors. There may be dynamic lesions of the brain and cord dependent upon an outside cause, such as would be furnished by the ductless glands. These changes being anterior to birth, would account for facial or bodily asymmetry. The muscular hyperexcitability might perhaps be the consequence of the disturbance in glandular function persisting after birth, which would explain the possibility of the appearance of the nystagmus, if not at birth, at all events during the first few weeks following that event. The nervous centres being then incomplete, it may be imagined that under the influence of the perverted internal secretions, aided, perhaps, by the combined action of an outside toxic cause, such as alcoholism in the forebears, certain of the higher faculties would fail to develop or would develop imperfectly. In this way we might explain the different degrees of intellectual feebleness observed, ranging from simple *émotivité* to grave mental alienation. Nature then bars the reproduction of such subjects by atrophy of the genital organs.

The conclusions of this suggestive communication (which is of particular interest to neurologists) may be shortly stated as follows:

There is a special syndrome characterised by three capital signs, *viz.*: 1, trembling; 2, stigmata of degeneration; and, 3, possible alterations in intelligence. It represents a particular variety of the group of the myoclonies—"myoclonic nystagmus." It constitutes, then, a new link connecting the varieties already known, which include Friedreich's paramyoclonus multiplex, Morvan's fibrillary chorea, certain electric choreas, Gilles de la Tourette's tics, and, lastly, Unverricht's epileptic myoclonus. All these forms, variable although they are in their clinical expressions, possess as a common feature the representation of different manifestations of a special and obscure morbid state, grafted, as it were, upon a basis of degeneration. In this syndrome one sign dominates all others, and that is nystagmus. Although it may occur in the other varieties, especially in Friedreich's paramyoclonus and in Unverricht's myoclonus, it merits the importance attached to it by the authors, on account of its constancy and its fixity. The affection is variable in its manifestations, and may, indeed, be reduced to nystagmus alone, which then, as already said, represents a mono-symptomatic variety of myoclonus. The affection is congenital. It is probable, when making its appearance after a febrile complaint, either that its signs have been exaggerated by the intercurrent affection or have been discovered only on a more attentive examination. The syndrome may be hereditary and familial. It is compatible with existence, and even with an active life, inasmuch as in the greater number of cases it is not accompanied by any defect, physical or psychical.

SYDNEY STEPHENSON.

X.—REMEDIES.

(1) Shumway, Edward A.—Report of a case of syphilitic iritis successfully treated by Salvarsan. *College of Physicians of Philadelphia*, 16th February, 1911.

(2) Marlow, F. W.—Note on the efficiency of one instillation of scopolamine as a cycloplegic for refraction work. *Ophth. Review*, March, 1911.

(3) Frenkel, A.—Prognosis and treatment of syphilitic optic atrophy. (Pronostie et traitement des atrophies papillaires d'origine syphilitique.) *L'Ophtalmologie Provinciale*, mars, 1911.

(4) Seidel, E.—A contribution to the determination of the action of Salvarsan upon syphilitic diseases of the eye. (Beitrag zur Frage der Salvarsan-wirkung auf luetische Augenleiden.) *Archiv f. Ophthalmologie*, Bd. LXXIX, Heft ii, 30 Mai, 1911.

(5) Worth, Claud.—A clinical lecture on ophthalmology in general practice. *Medical Press and Circular*, 28th June, 1911.

(6) de Mets.—The treatment of trachoma by subacetate of lead. (Le sous-acétate de plomb dans le traitement du trachome.) *L'Ophtalmologie Provinciale*, juin, 1911.

(7) Orth.—As to the action of dionin on the eye. A personal experience. (Zur Dioninwirkung am Auge. Selbstbeobachtung.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 27 Juli, 1911.

(8) Bistis, J.—On the action of "606" upon the eye and affections of the eye. (De l'action du "606" sur l'œil et les affections oculaires.) *Archives d'Ophtalmologie*, août, 1911.

(9) Bradburne, A. A.—Note on a case of acute plastic iritis, markedly benefited with antistreptococcus serum. *Lancet*, 23rd September, 1911.

(10) Godéchoux, René.—On some cases of interstitial keratitis and their treatment by tuberculin. (De quelques cas de kératite interstitielle, leur traitement par la tuberculine.) *La Clinique Ophtalmologique*, 10 septembre, 1911.

(11) Alt, Adolf.—On Aqua Zeozoni, a chemical means for the absorption of ultra-violet rays by instillation into the conjunctival sac. *American Journal of Ophthalmology*, September, 1911.

(12) Mitchell, Leonard J. C.—Rodent ulcer treated by carbon dioxide snow. *Trans. Ophth. Society U.K.*, Vol. XXXI, Fasc. 3, p. 158, 1911.

(13) Mackay, George.—Illustration of spring catarrh under treatment by radium. *Ibidem*, p. 217.

(1) **Shumway**, of Philadelphia, detailed the history of a case of "iritis," in a man, aged thirty-five years, occurring nine months after the primary lesion. Under mercurial treatment, the attack subsided in four weeks, but subsequently recurred in a more severe form. Despite vigorous treatment with mercury and aspirin, the attack failed to yield, and the Wassermann test remained positive. A subcutaneous injection of Salvarsan (administered by Henry Cattell), caused a disappearance of the inflammation within three days, and

the eye had remained quiet for a period of ten weeks. Reference was made to the reports of recurrences of symptoms, after injections of Salvarsan, which were appearing in literature, and the fact that certain cases of syphilis seemed to be refractory to it. Shumway thought that while the drug had failed to realise Ehrlich's hope that one dose would permanently cure syphilis in man, nevertheless it was to be welcomed as an exceedingly valuable remedy, especially in cases which did not respond to mercurial treatment.

(2) This is an analysis of 66 cases (131 eyes) in which the refraction was worked out under one application of scopolamine, by **Marlow**, of Syracuse, N.Y. It was found that a second application produced little or no difference in the amount of error detected after the first application. Scopolamine is therefore considered more trustworthy than homatropine, but the cycloplegia lasts twenty-four hours. A. H. PAYAN DAWNAY.

(3) **Frenkel**, of Toulouse, detailes at great length a case of optic atrophy in a man with tertiary syphilis. Although the secondary symptoms were not thoroughly treated, yet his children were quite normal.

Frenkel brings out in his article the importance of large doses of mercury and potassic iodide continued for a long time. With this treatment the patient's vision improved considerably, although his field of vision remained contracted. The special features of the case were the development of mental symptoms, of rotatory nystagmus, and of a white sector in the nasal side of the disc. PHILIP A. HARRY.

(4) Thirty-two patients from the eye clinic of Heidelberg were treated with Salvarsan in the following way.—Intravenous injection of 0·45-0·5 grm., according to weight and strength, but cases of arterioscleros with increase of blood-pressure, and of *vitium cordis* were excluded, followed after four to five days by a subcutaneous injection of 0·5-0·6 grm., and after three to five weeks by a second intravenous injection. No untoward results were observed, although the subcutaneous injections were, of course, very painful; once there was swelling of the arm and a rash which disappeared after five days.

Twelve of the patients were suffering from interstitial keratitis, nine of which, where the inflammation was recent, did very well indeed with but two exceptions; but where the inflammation had already run its course, no very great success could be hoped for, and the remedy was only administered in the expectation that a relapse could thereby be prevented. But in one case the other eye became involved, although mildly. Of six cases of iritis, four were florid and made a remarkably good recovery, but in two older cases the result proved unsatisfactory. The same remark applies to two cases of paralysis of the abducens, one of double optic neuritis, and one of old choroiditis disseminata. R. GRUBER.

(5) **Worth**, of London, gives an *aperçu* of several of the commoner diseases of the eye. The article contains comparatively little likely to interest readers of a technical journal, but at the same time one or two points may be briefly noticed. For example, the author speaks highly of the treatment of ophthalmia neonatorum by washing out the affected eye every hour with a warmed solution of potassium chlorate, 10 grains to the ounce. He quotes Mould's experience, to the effect that a 1 per cent. solution of dionine, dropped into the eye every day, "does much to hasten the absorption of a corneal opacity." One curious observation is that in infants with a watery eye, no punctum lacrymale can be found, but that most of these patients develop a punctum in the course of a few months, with consequent cure of the watery eye. Some 30 per cent. of Worth's own cases of iritis are due to syphilis, 10 per cent. to gonorrhœa, and most of the remainder to septic absorption from the alimentary tract. He is by no means convinced as to the reality of the existence of

"rheumatic" or "gouty" iritis. Despite the newer remedies, his faith in mercury inunction and the internal administration of the iodides remains unshaken. In patients other than children, Worth advocates retinoscopy through the undilated pupil. SYDNEY STEPHENSON.

(6) **de Mets**, of Antwerp, is aware of his difficult position when he recommends a lead salt in the treatment of an ocular condition. He uses a modification of M. Buysse's method. A paste is made of the freshly powdered subacetate of lead with a little water. This is spread over the mucous membrane of the everted lids and washed off after two minutes with a stream of water. The pain is acute, and the inflammatory reaction marked. The effect is kept up for several days by the use of a 25 per cent. lead lotion. The majority of cases do well, but the most suitable ones are those with exuberant granulations, but without pannus. PHILIP A. HARRY.

(7) **Orth**, of Gräfenberg, Oberfranken, gives a very good account of the action of dionin on iritis and keratitis in his left eye. The treatment consisted, during the first eight weeks, in atropine and warm applications; but upon the appearance of an iridocyclitis, the use of dionin was begun. Dusted on as a powder, there was a smart burning effect, which however was bearable. Within a few minutes "complete euphoria" was experienced, and the eye could look into a lamp without any pain; the intense photophobia disappeared; sound sleep was obtained; and in the morning ciliary congestion was practically absent.

A more rapid and effective dilatation of the pupil was reached after the onset of the dionin treatment. The fear of the establishment of tolerance prevented the application of the powder more than twice a week, and in this the treatment was so successful that there was no loss of action of the dionin after a course of two months. It further decidedly abbreviated the treatment, and aided in dispersing a large corneal opacity. W. B. INGLIS POLLOCK.

(8) **Bistis**, of Athens, concludes that "606" is not harmful to the eye; that it is not contra-indicated in the presence of changes in the optic nerve, whether of metasyphilitic nature or caused directly by the specific virus; and, lastly, that the results so far obtained justify us in including "606" amongst our most energetic means of combating ocular syphilis.

SYDNEY STEPHENSON.

(9) **Bradburne**, of Southport, obtained a strikingly good result from the injection of polyvalent antistreptococcus serum (Parke, Davis, & Co.) in a man of 46 years who was suffering from bilateral acute plastic iritis, believed to be due to suppuration around the roots of the teeth. Bacteriological examination of the blood confirmed the view that the ocular condition was streptococcal in origin. Scrapings from the root of a diseased tooth, however, yielded a negative result. Prior to the employment of serum, iodides and salicylates had been adminstered. It should be added that two injections of serum, each of 10 c.c., were administered, but the second one did little if any good.

SYDNEY STEPHENSON.

(10) This valuable article, by **Godéchoux**, of Amiens, is divided into six "chapters." In the first and second, syphilis and tubercle as causative agents of keratitis are discussed in connection with their characteristic appearances and course. The stigmata of hereditary syphilis are briefly catalogued. In the third chapter three cases are related at full length in which tuberculin was used therapeutically with good results. In the fourth chapter is discussed the question as to whether these three cases really were tuberculous. On this point the author reminds us that the three steps necessary to *prove* the correctness of the diagnosis cannot be taken. These three steps are: (1) the finding of the tubercle bacillus in the cornea, (2) histological examiation,

and (3) inoculation of a guinea-pig. The diagnosis must be based on the appearance of the lesion and of the patient, and on a careful examination of the latter *qua* concealed tubercle. Further, the reactions caused by tuberculin are not to be disdained. The cuti-reaction is the least inconvenient. The fifth chapter deals with the different kinds of tuberculin and the dosage. What the author employed was delivered to him by the Pasteur Institute as "Tuberculin for medical use, 1 c.c. containing 10 milligrammes of dry substance." This tuberculin, which is Koch's original tuberculin, is *un liquide filtré et glycériné des cultures de bacilles de Koch.* Godéchoux commenced with a dose of 1-40 milligramme and reached a dose of 2 milligrammes. The injections were given every second day, the earlier ones being subcutaneous, in order to watch for reaction at the point of inoculation. The patient stayed in bed the rest of that day. After some time the injections were given in the gluteal region, as for mercury salts. It must be remembered that some patients react strongly to infinitesimal doses. With these one must abstain from the use of tuberculin. The temperature is taken morning and evening every day, and four times on the day an injection is given. The sixth and last chapter is headed "The value of tuberculin therapy," and concerns the question as to whether in the cases related the action of tuberculin was a manifest one. These cases, which became cured or were improved by tuberculin, had been under mercurial treatment for months without any success. Again, is it possible the lesions were not tuberculous? In the author's opinion, lesions which are not caused by Koch's bacillus are not cured by tuberculin. Finally, when one finds lesions which seem to be tuberculous, it is to the advantage of the patient that tuberculin therapy be tried.

ERNEST THOMSON.

(11) "Aqua Zeozoni" is the name applied to a 0.3 per cent. to 0.5 per cent. solution of "Zeozon" or the ortho-oxyderivate of aesculin (obtained from the horse-chestnut), neutralized with boric acid. This substance absorbs such ultra-violet rays of light as have a wave-length of between 400 $\mu\mu$ and 300 $\mu\mu$. It has been applied to the eye by J. Ruhemann (*Berl. klin. Wochenschrift*, Nr. 27, 1911) with the idea of preventing the ill-effects of the ultra-violet rays of light. In his experience, it does away with the necessity for the use of veils, umbrellas, etc., and with the unpleasant symptoms due to dazzling, such as dizziness, headache, and so forth. It would seem to be specially indicated in high altitudes, at sea, and prophylactically in blinding snow light, and in such industries as employ very bright light. Its employment to the eye three or four times a day gives rise to no irritation, even when continued for a period of several months.

Alt, of St. Louis, has experimented with a small quantity of "Aqua Zeozoni" on both normal and diseased eyes. He has convinced himself that the new product merits investigation, and he promises a further report.

"Aqua Zeozoni" may be obtained from Kopp and Joseph, Potzdamer Str., 122, Berlin, Germany. SYDNEY STEPHENSON.

(12) **Mitchell**, of London, succeded in healing a rodent ulcer of some size, situated in the neighbourhood of the inner canthus, by eleven applications of a very hard pencil of carbon dioxide snow. The applications, each of which averaged sixty seconds, were made once a week. SYDNEY STEPHENSON.

BOOK NOTICE.

Ocular Hygiene and the Inspection of Schools. (Hygiène Oculaire et Inspection des Ecoles.) By Drs. H. TRUC, of Montpellier, and P. CHAVERNAC, of Marseilles. Third edition. A. Maloine. 1911.

This book is arranged in three parts. The first part might be considered as entirely separate from the rest, for the information there set forth is of an elementary nature, such as might be suitable for a school teacher. The other parts are of a different order, and appeal to those who have had medical training or at least some experience of public health work.

The entirely dissimilar outlook required of the reader by the disparity of the two divisions of the book make the work difficult to place and unsatisfactory.

Part I takes up just a hundred pages; fifty of these are devoted to the most elementary anatomy and physiology of the eye, with brief definitions of the various diseases it is subject to. So far as the anatomy and physiology is concerned, it is no more than an elementary school pupil-teacher would be expected to know. The second half of this part gives a fair summary of school conditions.

There passes under review the position of buildings; lighting, natural and artificial; photometry; school furniture; materials; printing; and writing. The account, on the whole, is very satisfactory, and just that which the beginner in school medical inspection would wish to learn about. Exception might be taken to certain points, *e.g.*, the writers recommend two methods of photometry; both depend upon the recognition of minute markings within reading distance. Such a method seriously aggravates the personal equation which is inseparable from all photometry work.

Part II comprises a general survey of the conditions existing (or believed to exist) in European and American states and cities in regard to visual defects in scholars, in school arrangements, and in teaching. That part which relates to France and the writer's own examination of schools is very interesting, and well worth the perusal of those interested in school work. Other countries are very unevenly treated. That information which can be checked is out of date, *e.g.*, the regulation as regards window lighting for England are those of 1870, the schools of that date that are subject to the code are almost all reconstructed and the rule of that day is counted a sin to-day. They deal at length with the myopic child and the conditions tending to produce or to exaggerate the defect, and their directions are excellent. They have not, however, arrived at the desirability of the educational difficulty of providing for myopic children; so far as the book indicates, no country has considered it; but such a school for myopes has been working for over two years in London and bids fair to be the forerunner of a regular scheme of "prophylactic education." In the matter of external diseases the authors rightly insist upon the necessity for inculcating habits of personal cleanliness, but, curiously enough, no caution is given against the common school towel supply which is so fruitful a source of school epidemics.

Part III is a brief account of how medical inspection of school children should be conducted so far as the eyes are concerned, and arrangements that obtain in their districts for the treatment of defective children. There are indications that the burning question of London municipal politics is not without its counterpart in France.

N. BISHOP HARMAN.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

SMITH'S CATARACT OPERATION.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

In the September, 1911, issue of THE OPHTHALMOSCOPE, p. 668, among the Book Notices, I note with interest Major Elliot's remarks concerning the contents of my article on "Smith's Cataract Operation."

I feel that the announcement should be made to the profession that this is not a book for sale on the market, as the review would lead one to believe. It is what the title page announces: "A Descriptive and Illustrated *Article*, written during a visit to Smith's Clinic at Jullundur, Punjab, India," which was, as stated under the caption, "presented to the Chicago Ophthalmological Society, and read by invitation at its meeting, 19th December, 1910." It is descriptive of Smith's operation as he does it, and has, so far as I know, only one precept of my own, which is, that if the lower lid is fully retracted, there is no danger of vitreous escape when the patient looks down (p. 73). The copy which was handed to you was one of 150 reprints, which were bound as souvenirs and complimentary copies for distribution among the members of that society and a few of my personal friends. The rest of the "reprints" were in pamphlet form, and have been gratuitously distributed to the profession, principally on this side the Atlantic.

Since Major Elliot's review may stimulate the English, Continental, and Colonial ophthalmologists to desire copies, I am having another verbatim edition printed, and shall be happy to send a copy free to any one who will let me have his address.

I would not answer the review referred to if there were no questions asked, but there are, and since the readers of THE OPHTHALMOSCOPE are entitled to learn the answers of these questions, I now beg the privilege of doing so.

The reviewer asks, "What is the term 'finger capillary sponge' meant to convey?" (p. 17) Dr. Vail appears to be very vague as to the meaning of "capillary attraction," which he uses in the same paragraph.

I fully explained in a few words what is meant when on the same page I stated that immediately following the douching of the conjunctival sac, Smith gets rid of the excess of fluid which remains in the sac as follows: "Smith merely depresses the speculum to its first position, tilts the patient's head slightly to the temple side and applies his thumb or finger close to the outer canthus (but not touching the conjunctiva or lid margin) and thus 'draws off' the excess of fluid."

It occurred to me that the reviewer thinks "capillary attraction" has something to do with capillaries. I need not apologize for his not knowing what capillary attraction is. The term "finger capillary sponge" is a metaphor which to any one possessing imagination is intelligible; but for the reviewer's edification (since he asks), I will say that a sponge absorbs moisture by capillary attraction (see any school book on Physics), but that instead of a sponge, Smith uses his finger to draw off the moisture, as he abhors sponges.

The next question asked is "Why does Dr. Vail imitate Smith in the use such a term as 'ciliary ridge' (p. 50)? The expression has no anatomical significance. The phenomenon under reference is presumably due to the scleral ring." The term "ciliary ridge" is correct; that is why I used it. It is the ridge produced by the ciliary body projecting, as it does, towards the edge of the lens. It is the "corona ciliaris." Fuchs explains it thus (*Text-book of Ophthalmology*, Second American Edition, p. 257): "The anterior zone of the ciliary body bearing the ciliary processes, is called the folded part of the ciliary body—corona ciliaris." The expression "ciliary ridge" has recognized anatomical significance—see Norris and Oliver's *System of Diseases of the Eye*, Vol. I, top of p. 44, where, speaking of the ciliary body, is stated the following: "and over that portion of its surface next the margin of the lens, also is raised into annular ridges, or folds, that project all round towards the lens. This is the *ciliary ridge* with its processes." (Italics are mine.)

As for the *scleral ring*, which Major Elliot states is presumably what is meant, I would say certainly *not*. The scleral ring, as every practising ophthalmologist, with a few exceptions, knows, is one of the markings of the fundus oculi—"a narrow white ring" around the optic nerve at its entrance in the bottom of the eye (Fuchs, *loc. cit.*, p. 10).

The next question asked by the reviewer is "Does Dr. Vail use the term 'calcified' correctly at the bottom of page 70? It seems possible that he does not." Let me give the entire sentence where the word 'calcified' occurs. I said: "One thing is certain, it (the detached capsule accidentally left behind) is never absorbed; on the contrary, it usually thickens and becomes *apparently calcified* after a long time, as was proven in the cases of couched lens operation done many months before, where the capsule had been wounded by the lens coucher and the soft cortex had absorbed, leaving nucleus and a complete capsule of astonishing thickness." I said "apparently calcified," as that is what I meant, and I believe the term is rightly used.

There is only one more question the reviewer asks; it is reference to what Major Elliot announces as "the one sentence more weighty than any other" in the article, and I am glad to have the lime-light turned on this one sentence. It occurs on page 33, and is as follows: "I would be sorry to see all oculists undertake extraction in the capsule, sorry for the patients as well as for the bulk of the operators, for it is not an operation for any man to undertake, no matter how successful and skilful he is, until he has learned *how to do it* and how to meet the contingencies which arise. This is only learned in two ways—first, by experience; second, by taking lessons."

Elliot quotes an American surgeon as stating that in America the opinion was gaining ground that intracapsular extraction was all very well for a surgeon who has charge of a large institute for old soldiers, and who could, therefore, get the necessary experience, "but that it was too risky for the average surgeon"; and then Major Elliot asks, "Is this what Dr. Vail means by experience?" My answer is, experience is experience, whether it is acquired one place or another. I do not call a three days' visit to Smith's clinic "experience" any more than I would a three days' visit to Moorfields. I call operating from two hundred to three hundred times under the eye of a master surgeon the best and quickest way of "gaining experience." After the experience and proficiency are acquired, the surgeon may go where he wishes, and operate according to his experience gained, and the public will find out what this experience amounts to.

The surgeon will, after having gained experience in different methods, naturally follow the one he knows in his own mind is best.

I have answered all the questions asked, and would like to challenge the criticisms, but time and space forbid. If the reviewer or the readers would like to have me answer them, I shall be glad to do so in another correspondence.

It is true that Major Elliot was "at Jullundur with Dr. Vail," as he states, but it was only for three days. I was there for six weeks.

Regarding statistics of the operations I did at Jullundur, I have them ready for publication. Colonel Smith looked them over in London recently and approved them.

Very truly,
D. T. VAIL.

24, Eighth Avenue East,
Cincinnati, Ohio, U.S.A.,
25th September, 1911.

NOTES AND ECHOES.

Deaths.

A past-master of medicine, John Hughlings Jackson, F.R.S., died at his residence in Manchester Square, London, on October 7th, at the age of 76 years. As a neurologist, Jackson's name and fame were known the world over. But his connection with ophthalmology also was both long and close. He played no insignificant part in popularising the employment of the ophthalmoscope in the earlier days, and insisting upon the valuable services it could render to the physician and the neurologist. In 1877 he delivered the annual oration before the Medical Society of London, taking as his theme "Ophthalmology in its Relations to General Medicine." Jackson, who was then physician to the London Hospital and to the National Hospital for the Paralysed and Epileptic, was an original member of the Ophthalmological Society, and one of its first vice-presidents (1880-2). In the year 1885 he delivered the Bowman Lecture of the Society on "Ophthalmology and Diseases of the Nervous System." In 1889 he was elected president of the Society. Jackson contributed articles on subjects of ophthalmic interest to the *Transactions* of the Ophthalmological Society, the *Royal London Ophthalmic Hospital Reports*, and other periodicals.

A famous ophthalmologist, Dr. Julius von Michel, director of the Royal University *Augenklinik* in Berlin, died on September 28th last at the age of 68 years.

v. Michel was born in 1843 at Frankenthal in the Pfalz. From 1868 to 1870 he assisted Horner at Zurich. After working with Ludwig and Schwalbe at Leipzig, v. Michel was in 1872 recognised as *privat-dozent* of ophthalmology in that University. In the following year he was appointed professor of ophthalmology at Erlangen, and in 1879 he was translated to Würzburg in a similar capacity. After upwards of twenty years' work at Würzburg, he was called to Berlin in succession to Schweigger. v. Michel was the author of a popular *Lehrbuch der Augenheilkunde*, and for many years had edited that most useful compilation, Nagel's *Jahresbericht*. He founded with Professor

H. Kuhnt the *Zeitschrift für Augenheilkunde*. He was the author of the section on diseases of the eyelids in the Graefe-Sæmisch *Handbuch*. v. Michel had been in failing health for some time, but the rumour that he intended to retire from his professorship was contradicted only a few weeks ago (THE OPHTHALMOSCOPE, Vol. IX, p. 675). Death occurred from heart disease.

Dr. Alvin A. Hubbell, formerly professor of ophthalmology and otology in the Univerity of Buffalo, died on August 10th last at the age of 65 years from general arterio-sclerosis. He had occupied the post of emeritus professor of ophthalmology since the early part of the present year. Dr. Hubbell, who was the descendant of an old English family, received his medical education at Philadelphia and at Buffalo. He graduated M.D. from the latter university in the year 1876, and in 1893 Niagara University bestowed upon him the honorary degree of Ph.D. He was a voluminous and acceptable writer, and a member of the American Ophthalmological Society and of many other scientific associations.

The death is also announced from America of Dr. Blencowe E. Fryer, of Kansas City, which occurred on August 13th, and of Dr. Orvid E. Osell, once professor of clinical ophthalmology in the University of Kansas, on July 25th, at the age of 43 years, and of Dr. R. F. Bauer, once a member of the staff of Wills Eye Hospital, Philadelphia.

* * * *

Appointments.

DR. E. MARRI has been recognized as *privat-dozent* of ophthalmology in the University of Florence.

Dr. H. S. Gradle has been appointed professor of ophthalmology in the Chicago Eye, Ear, Nose, and Throat College.

Dr. K. H. Sattler has been recognized as *privat-dozent* of ophthalmology at Königsberg.

Dr. R. Cords has been recognized as *privat-dozent* of ophthalmology at Bonn.

Dr. C. H. Spears has been re-appointed oculist to the Julia F. Burnham Hospital, Champaign.

Dr. F. Park Lewis, of Buffalo, New York, has been re-appointed commissioner for the State School for the Blind at Batavia, New York.

* * * *

Ophthalmological Societies

DR. FREDERICK J. TOOKE, of Montreal, Canada, has been elected an associate member of the American Ophthalmological Society.

Mr. Sydney Stephenson, of London, England, has been elected a member of the Heidelberg Ophthalmological Society.

* * * *

Professor Greeff's text-book.

In the present issue of THE OPHTHALMOSCOPE we publish the first instalment of a translation of the third German edition of Professor Greeff's *Anleitung zur mikroskopischen Untersuchung des Auges*, the work of Dr. Hugh Walker, of Glasgow. We trust it may be popular with readers.

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Changes in refraction.

A VERY important practical point was discussed in the Section of Ophthalmology of the American Medical Association at the Los Angeles meeting held in June last. This was whether changes were likely to occur in the refraction of corrected ametropic eyes. Dr. W. Zentmayer, of Philadelphia, as the result of an analysis of the changes in refraction in 550 eyes, concluded that ametropia tended to change in degree, even when the error had been carefully corrected and the glasses worn constantly. Almost any conceivable change might occur. The tendency was in the direction of an increase in the static refraction, along with an increase in the astigmatism. Astigmatism was often acquired by hyperopic eyes, and as frequently in the third as in the fifth decade. A change in the axis of the astigmatism occurred in about 50 per cent. of the cases. Dr. Zentmayer's experiences were confirmed by Dr. C. D. Westcott, of Chicago, Dr. Hiram Wood, of Baltimore, and some other speakers.

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American Medical Association.

DR. ADOLF ALT, of St. Louis, and Dr. Edgar S. Thomson, of New York, have been elected President and Secretary respectively of the Section of Ophthalmology of the American Medical Association

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Action against Eye "Specialists."

AT Blackburn County Court recently, Geo. Almond, of Cumberland Street, Blackburn, claimed from Jahanngir & Sons, "eye specialists," of Montague Street, Blackburn, £15 damages, made up of £2 17s. 6d. paid in fees, and £12 2s. 6d. for alleged improper treatment. Mr. Walmsley, for plaintiff, said, on the advice of a friend, Almond, who was suffering with his right eye, consulted defendants. He was under their treatment until May 15th. Subsequently he saw Dr. Owen, who advised him to see a specialist, and he went to Dr. Jones, Manchester, who removed the eye. Dr. Owen would tell them plaintiff was suffering from sarcoma, which should have been discovered by an ordinary practitioner. In such a case the only course to follow was to have the eye removed, and it was hopeless to attempt any cure by drugs. Plaintiff said after he commenced treatment defendants told him the eye was improving, and that, as the trouble had come gradually, it would go away slowly. Before he started treatment by defendants, he asked a member of

the firm if they could cure him, and got an affirmative reply. A member of defendant firm said his firm would not give a guarantee for complete cure if £100 was offered them. Members of his family had practised as eye specialists in England since 1889. No guarantee was given to plaintiff, who was suffering merely from inflammation of the eye. The Deputy-Judge decided plaintiff could not succeed. His own evidence showed the treatment had at any rate done no harm, and to prove fraudulent misrepresentation he would have to show that the defendant firm was a bogus concern, and that defendants got money without doing anything. If people would take the risk, when there were proper medical gentlemen about, of going to people not within that category, they must abide by the result. His Honour gave a verdict for defendants.

* * * *

Reading for the Blind.

ALL who practise ophthalmic surgery frequently come across those sad cases in which the sight of an individual is either already lost altogether or so seriously impaired that for all practical purposes he is blind, or will become so. From want of knowledge or advice such persons often give themselves up to despair from their inability to know how to make themselves useful. A correspondent who is for all practical purposes blind has written to us pointing out how such people may be materially benefited if surgeons would recollect that reading for the blind is quite possible by means of the Braille type, which is now so generally used by those whose sight is lost and who have learnt how to use it. If surgeons would place this before their unfortunate patients much might be done to ameliorate their condition. After a little practice the blind are quite as well able to use a typewriter as those who can see. Nor are reading and writing by any means the only occupations left to those who lose their sight. Many among them carry on trades such as basket-making, mat-making, brush-making, and chair-caning, while among their ranks are some who practise massage and music-teaching. Such games as chess, draughts, and all kinds of card games may be played with specially adapted apparatus which is made for them. All who can afford to do so should engage competent blind persons to teach them how to get the best out of their altered and sad condition. If oculists were to realize the importance of this matter they could do much by being able to recommend blind instructors for their patients. There are many home teaching societies for the blind throughout the country whose teachers visit the blind in their own homes and give instruction. Much Braille literature is circulated in this way, and books are lent for reading and exchanged when finished with. Any one interested in the subject of what the blind can do for themselves may get information from Mr. H. J. Wilson (Secretary of Gardner's Trust for the Blind), 53, Victoria Street, Westminster, with regard to home teaching societies for the blind, schools, workshops, and such-like institutions; while from Mr. H. Stainsby (Secretary-General of the British and Foreign Blind Association), 206, Great Portland Street, W., information may be obtained regarding apparatus and appliances made for the use of the blind, including the Braille type and literature printed in this manner.—*British Medical Journal*, 7th October, 1911.

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Major G. H. Fink (retired).

THE unhappy affair of Surgeon-Major G. H. Fink, Indian Medical Service (retired), was ended at the Old Bailey, London, on October 10th, when the jury found him guilty of forging and uttering a cheque for £11,000. At the same time he was declared to be insane, and was ordered to be detained during the King's pleasure. The forgery was of such a transparent character as almost of itself to afford good evidence of Major Fink's insanity. The poor man withdrew from the National Discount Company the balance of his deposit account, amounting to £11 3s. 10d., paid by cheque. The figures on this cheque he altered (so it was alleged by the prosecution) to £11,000 3s. 10d., and sent the cheque to a London bank for collection. The alteration was, of course, immediately detected, with the result mentioned above. Great sympathy cannot but be felt for Mrs. Fink and her children, two of whom have not completed their education. Circumstances are straitened with the unfortunate lady.

* * * *

The notification of Ophthalmia neonatorum.

IT is of interest to note that the movement for the notification of ophthalmia neonatorum in this country spreads apace. According to the latest figures, outside London, notification of the disease has been provided for by 36 boroughs, 49 urban sanitary districts, and 25 rural sanitary districts. Three of these bodies have adopted notification only for a limited time, but the remainder stand permanently committed.

* * * *

Glasgow Opticians and Glasgow Eye Infirmary.

A FEW weeks ago application was made by the governors of the Glasgow Eye Infirmary to the Board of Trade for a licence to register under the Limited Liability Act without the necessity of adding the word "limited" to its name. One of the provisions of the licence asked for was that the infirmary should be empowered to sell spectacles to those requiring them. The attention of the Law and Parliamentary Committee of the Institute of Ophthalmic Opticians was directed to the effect which the granting of such power might have on the business of opticians in Glasgow, and it was decided to oppose the granting of the licence. At a meeting of the council of the institute, held on October 4th in London, it was reported that as a consequence of the representations made, the Board of Trade had deleted from the licence the clause objected to. Mr. A. Boardman, in moving the adoption of the report, observed that the Institute had secured a signal victory in the interests of the opticians of Glasgow—indeed, of the whole country.—*British Medical Journal*, October 14th, 1911.

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Professor L. Bach.

Dr. L. BACH, director of the University Eye Klinik at Marburg, has been nominated *Geheimrat Medizinalrat.*

Messrs. John Weiss & Son, Limited, of 287, Oxford Street, London, W., have recently issued as a separate volume an illustrated catalogue of ophthalmic instruments and appliances. We have here the latest word in eye instruments. That is not all, for the everyday appliances of the ophthalmic surgeon, such as trial cases, test types, testing frames, and so forth are all in evidence in Messrs. Weiss's catalogue. The book can be obtained gratis on application to Messrs. Weiss.

THE

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A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

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ORIGINAL COMMUNICATIONS.

VACCINE THERAPY IN EYE DISEASE.*

BY

C. W. G. BRYAN, F.R.C.S.

LONDON, ENGLAND.

GENTLEMEN,

In dealing with the subject of vaccine therapy in eye disease, I think it advisable first to state shortly some facts about the general treatment of disease by vaccines, and later to give, as far as the space at my disposal will allow, the results obtained by the use of this form of treatment in diseases of the eye.

As you are aware, vaccine therapy concerns itself with the production of active immunity against bacterial disease. Now, active immunity can be acquired in two ways :—(i) by auto-inoculation by bacterial substances set free from some focus of disease ; (ii) by the methods of hetero-inoculation, where a vaccine is prepared and administered to the disease subject, usually being injected subcutaneously.

Auto-inoculation is produced by disturbing the diseased area in some way, *i.e.*, by massage, movement, heat, etc. In disease of the eye auto-inoculation is an unsatisfactory method of producing immunity. Owing to the limited blood and lymph supply of the eye, it is difficult to set free bacterial substances from the eye into the general circulation, and again, the size of the area of infection, as compared with the body as a whole, is small, and therefore great disturbance of this area of infection would be necessary to produce any marked auto-inoculation, and such disturbance would be likely to do serious harm to so delicate an organ as the eye.

In using vaccine it is necessary, as far as possible, to prevent auto-inoculation, and this is done by keeping the diseased part at rest. If, while treatment by vaccine is being carried out, auto-inoculation takes place at the same time, bacterial substances of unknown amount may be set free in the blood stream at unfavourable times, causing a variation in the dose of vaccine administered.

While treating eye disease by vaccine we have, then, as far as possible, to prevent auto-inoculation, and this is one of the difficulties of this branch of vaccine therapy. It is advisable not only to limit the movements of the eye, as a whole, but also to set at rest its intrinsic muscles by means of drugs. Mydriatics for this purpose are, as a rule, contra-indicated, since they tend to decrease the blood supply of the anterior parts of the eye. If possible, in dealing with disease of the cornea, I use physostigmine.

Sir Almroth Wright and his co-workers have shown by the opsonic index, that the injection of vaccine into a diseased subject causes changes in the amount of opsonin in the blood, changes which can be followed by means of the opsonic index.

According to the dose of vaccine administered, four main effects can be produced, as shown by opsonic index curves.

(i) If a small dose of vaccine be given, no effect on the index may be produced, although even in this case clinical benefit may result.

(ii) A dose which has only slight effect causes changes in the amount of opsonin in the blood—first, a rapid slight rise of the opsonic index, to be followed by a gradual fall to about the level at which it stood before inoculation. This is known as a "positive phase."

*A lecture delivered on May 9th, 1911, in the course for the Diploma in Ophthalmology of the University of Oxford.

(iii) The usual effect aimed at is the production first of a "negative phase," that is, a fall of the opsonic index immediately following the inoculation. This should not last longer than about thirty-six hours, and should be succeeded by a positive phase of comparatively long duration.

(iv) If an overdose be given, a negative phase only may be produced, causing nothing but harm to the patient, and possibly lasting for several weeks.

In treating acute disease we attempt, by giving small doses at short intervals, to produce only positive phases ; but in chronic disease more benefit will result from the longer positive phase which follows a dose of vaccine which is large enough to produce a temporary negative phase ; in fact, it is our aim to produce, by repeated injections, negative phases as short as possible, followed by positive phases as long as possible. As the positive phase passes off, the injection is repeated. In treating a disease for any length of time, it is necessary to increase the dose of vaccine very gradually. The size of the dose and the length of the interval between successive inoculations vary with the nature of the disease and its bacteriology.

Methods of controlling the dosage.

The opsonic index has been mentioned as a method of regulating the treatment by vaccine. The index, to be of any value, has to be very frequently determined. It is a very difficult and laborious method, and I believe that many cases can be treated without its use, especially some eye diseases.

It has been found that clinical symptoms closely follow variations in the opsonic index ; when the index is high, the temperature in febrile cases falls, the general condition improves, pain is decreased, etc. ; conversely, during a negative phase, symptoms are aggravated.

In eye disease local clinical signs and symptoms are especially valuable ; during a positive phase, pain and photophobia diminish, vision improves, ciliary injection decreases, etc. By direct inspection of a diseased eye, then, we can obtain a very good idea of the progress of the inflammation, and can regulate the vaccine treatment. Photophobia is a valuable symptom ; and in disease of the iris, cornea, and sclerotic the amount of vascular injection of the conjunctiva may be an excellent guide to treatment. This vascular injection is relieved during a positive phase, although very frequently immediately after an inoculation, while the negative phase is present, it is temporarily increased. In cases of tuberculous keratitis I have found it a most valuable guide, repeating the dose of vaccine whenever the vascular injection recurred, each dose being followed by a period of absence of conjunctival injection and of photophobia. The keratitis meanwhile gradually becomes cured.

I may call attention here to some of the general differences between the treatment of eye disease by vaccine and the treatment of disease in other parts of the body. These differences largely depend on the anatomical peculiarities of the blood and lymph supply of the eye. On the whole, the blood and lymph supply of the eye is poor, and especially is this the case in certain parts, *i.e.*, the cornea. Now in using vaccines it is not sufficient merely to raise the opsonic index of the blood ; we must also take steps to bring a plentiful supply of blood to the diseased tissues—this is a difficult matter in the eye, but, as far as possible, as I have already mentioned, it is important to avoid the use of mydriatics and to employ myotics, whenever we can do so with safety. Hot applications, such as the use of radiant heat, etc., are valuable for the same reason. We must bear in mind also the fact that normally the blood supply of the various parts of the eye is constantly varying owing to the unceasing movements of the eye

as a whole and of its various parts, the iris, ciliary body, etc., and these movements are liable to set up small auto-inoculations, which we must try to avoid.

On the whole, larger doses of vaccine are necessary in the treatment of intrinsic disease of the eye than are used in infections of other parts of the body, and there is less danger from the production of negative phases.

I now propose to deal *seriatim* with the various bacterial diseases which have been treated by vaccines.

Tuberculosis.

The vaccine treatment of tuberculosis commenced with the use of old tuberculin. The use of this preparation in the doses advocated at first was followed by disastrous results in eye disease, as in disease elsewhere, and the use of old tuberculin has been practically abandoned. Its place has been taken by less dangerous preparations; many varieties of tuberculin have been employed, the most important being Tuberculin T. R. and the Bacillary Emulsion. The last is the preparation which I have used in treating tuberculosis of the eye, and I shall refer later to some of the results which I have obtained with it.

Bovine Tuberculin has been employed in the treatment of human eye disease, but I do not propose to refer here to this method.

Regulation of dosage.—Two important methods of dosage, differing widely, have been employed most largely in recent years:

1. Wright's method.—Treatment is commenced with a very small dose $\frac{1}{200000} - \frac{1}{40000}$ mgrm, and is carried out over a long period, the dose being gradually increased, with about ten days' interval between each inoculation; the treatment is regulated by frequent examinations of the opsonic index.

2. von Hippel's method of treatment with Tuberculin T. R.—An initial dose of 1/500 mgrm. is given and the inoculation repeated on alternate days, each time increased by 1/500 mgrm. until a dose of 1/50 mgrm. is reached; after this point the dose is increased by 1/50 mgrm. up to 1/5 mgrm. Then by 1/10 mgrm. until a dose of 1 mgrm. is being given. During the treatment the temperature should not rise above 100° F. If it does so, the previous dose, or a smaller one, is given until the inoculations cease to be followed by a rise of temperature.

In treating a series of cases while house surgeon at the Oxford Eye Hospital, I used small doses of Tuberculin (bacillary emulsion) regulating the treatment, partly by examination of the opsonic index, and partly by observation of the clinical signs and symptoms. At the beginning of treatment in each individual case I found the opsonic index of great value in enabling me to arrive at a suitable dose; after treatment had been carried on for some time, however, I was able largely to dispense with the index and to rely on clinical signs.

Extrinsic tuberculosis of the eye.

1. **Conjunctivitis.**—One case of tuberculous conjunctivitis which I have treated over a long period is worthy of short mention.—The patient, a woman of 61 years, attended the Oxford Eye Hospital for a lump in the right lower lid, which commenced about Christmas, 1906. The mass was removed, but the disease reappeared rapidly in the upper lid, continuing to increase in size, in spite of treatment by caustics, scraping, etc. At the beginning of 1908 the whole of the inner aspect of both lids of the right eye was covered with fungating granulations; the upper lid projecting over the lower, so that the eyeball could be seen with difficulty. The cornea was rough and opaque. Scrapings from the granulations were taken, and tubercle bacilli found. Treatment by

Tuberculin B.E., commenced in March, and, regulated by the opsonic index, was continued until the end of 1910, when I saw the patient last. In December, 1910, the conjunctivitis was cured, and there was no injection except one small area, the size of a pin's head, in the upper lid. The thickening had disappeared and the lids seemed to be of normal consistency. The eye could be practically fully opened, and the cornea was smooth and showed only slight opacity in its upper part.

Dosage.—In March, 1908, an initial dose of 1/8000 mgrm. was given, and was followed by a marked negative phase; 17 days later 1/20,000 mgrm. was given and, after this, injections were given about every 10 days, gradually increasing in size. In May 1/8000 mgrm. was being given. In October 1/5000 mgrm. and in December 1/3000 mgrm. During 1909 the dose was increased to 1/2000 mgrm.

The blood supply of the lids is good, and chiefly for this reason the treatment of tuberculous conjunctivitis, both in my hands and in the hands of other workers, has been followed by satisfactory results provided the treatment be carried out over a long period.

2. **Tuberculous Interstitial Keratitis.**—I have treated one case with excellent results.—A boy of 11 years, had suffered from tuberculous cervical glands and phlyctenular ophthalmia since 1901. In February, 1908, when I first saw the case, interstitial keratitis had commenced in the left eye, the whole cornea was steamy, and there was intense ocular injection and photophobia. The right cornea had a recent ulcer. Treatment by Tuberculin B.E. was carried out from March until August, 1908. At the commencement a dose of 1/15,000 mgrm. was given, and this was gradually increased until in August 1/4000 mgrm. was given. For the first two months, regular estimations of the opsonic index were made; after this treatment was regulated by clinical signs, onset of redness and photophobia indicating whenever a fresh dose of vaccine was required. The corneæ gradually cleared and vision improved, and in August both eyes were quiet, and the corneæ clear but for old nebulæ.

3. **Phlyctenular ophthalmia.**—The majority of cases of phlyctenular ophthalmia occur in children suffering from cervical adenitis. An error of refraction, usually hypermetropic astigmatism, is nearly always present.

The patients are subject to repeated attacks of phlyctenular ophthalmia, extending over a long period of time. I think it is generally accepted that phlyctenular ophthalmia is tuberculous in nature, or at any rate occurs in children suffering from a focus of tuberculosis elsewhere in the body.

I have treated about twenty cases of this nature with tuberculin, usually patients who have suffered for months or years from chronic inflammation with recurrent attacks of phlyctenules. I have given as an initial dose 1/15000—1/10000 mgrm., and the results have been strikingly good. After a few doses of tuberculin, sometimes after the first dose, the eyes have become quiet; at this stage it is most important that the error of refraction be measured and suitable glasses fitted, and if this be done, inoculations can be given up without fear of the recurrence of phlyctenular ophthalmia.

Internal Tuberculosis.

In internal tuberculosis we have to deal either with localized lesions affecting various parts, usually the iris or choroid, or with generalized disease involving the iris, ciliary body, and choroid.

I have treated a few such cases with small doses of tuberculin without much result, I regret to say. Recently, however, it has been shown that larger doses than usual must be employed in these cases, and after prolonged

treatment, excellent results have been obtained in the hands of many workers. I believe that the comparatively bad prognosis in these cases, the necessity for very prolonged treatment, and for the use of comparatively large doses of tuberculin, are due to the fact that the circulation of the internal parts of the eye is poor, and there is, therefore, great difficulty in bringing blood to the diseased parts, to whatever height we may have raised the opsonic index. The blood supply of the iris is better than that of other parts, and the prognosis of tuberculosis of the iris is correspondingly better, but we must remember that even here it is necessary to use mydriatics, which diminish the flow of blood through the iris.

In treating (internal) tuberculosis of the eye we have few clinical guides to treatment by vaccine, and I think it is advisable to use the opsonic index in these cases. If no focus of disease elsewhere in the body is discoverable, I repeat that larger doses of tuberculin than usual should be employed. Treatment should be commenced with $\frac{1}{2000}$ mgrm. and the dose should be increased fairly rapidly if no marked negative phase is produced.

Diseases due to Pyogenic Organisms.

In the space at my disposal I can only deal shortly with this branch of the subject, a branch however of great importance, as results far more striking than in the case of tuberculosis have been obtained by the use of vaccines.

In most cases it is possible, and advisable, to use a specific vaccine obtained from the diseased focus, but in diseases due to the staphylococcus a "stock" vaccine is perfectly efficient in nearly all cases. In diseases of gonococcal origin, too, a stock vaccine must usually be used, owing to the difficulty of preparing a specific vaccine and to the usually acute course of the disease. In these cases a stock vaccine gives quite satisfactory results.

I do not propose to describe the method of preparing vaccines here, but will at once pass on to the treatment of the diseases of the various regions which come within the province of eye surgery.

External Infections.

1. **The lacrymal sac.**—Acute inflammations are usually due to streptococci, and stock vaccines, if any, must be used, as there is little time for preparation of a specific vaccine. In the cases which I have treated I have not been satisfied that vaccine influences the course of the disease.

The most important variety of chronic inflammation is that due to the pneumococcus, important for two reasons, first, because slight injuries to the cornea are very liable to become infected and to result in severe ulceration, and, secondly, because any operation carried out on the eyeball, such as for cataract, must be attended with great risk of sepsis.

I may briefly refer to a case which illustrates the vaccine treatment of chronic pneumococcal infection of the lacrymal sac and tissues surrounding it. A man of 66 years had attended the Oxford Eye Hospital in November, 1905, with left cataract and suppuration of the lacrymal sac. After other treatment had failed, the sac was extirpated in August, 1907, leaving, however, a sinus. Cultures of pneumococcus were obtained in February and April, 1908, rendering operation for cataract impossible. I may mention that the other eye had been amblyopic for years. I prepared a specific vaccine and carried out treatment, regulated by the opsonic index, from 2nd May to 3rd August, 1908. An inoculation was given every ten days, commencing with ten millions and gradually increased by the beginning of June to fifty millions. After the latter dose, however, a

negative phase was produced, so up till 3rd August thirty millions were injected every ten days. Cultivations on 6th July and 3rd August giving no growth of pneumococcus, preliminary iridectomy was performed, followed later by cataract extraction, with no unfavourable symptoms after either operation. In December, 1908, vision with glasses=6/9.

Other organisms cause chronic inflammations of the lacrymal region, and may be treated with appropriate vaccine on general lines.

Diseases of the lids.

Staphylococcus aureus is the cause, as everybody knows, of many varieties of chronic or recurrent disease of the lids. Such cases give excellent results with stock vaccines, in doses of 100 to 1000 millions. In chronic blepharitis, recurrent chalazions, and hordeola, and in a variety of recurrent conjunctivitis, due to chronic infection of the Meibomian glands, described by Mr. R. W. Doyne,* vaccine treatment has given excellent results. I may here lay stress on the necessity for correcting any error of refraction present in these cases, as eyestrain is the usual predisposing cause of chronic infections of the lids.

Conjunctivitis.

Of acute infections of the conjunctiva I propose only to touch on one variety as being specially suitable for vaccine treatment, namely, gonococcal ophthalmia. I have seen striking benefit from the use of small doses ($\frac{1}{2}$—1 m.) of vaccine repeated every 48 hours or so. The object is to obtain with each dose an immediate positive phase not preceded by any negative phase. Every effort must be made to increase the blood supply of the cornea and to wash away discharge frequently. Free discharge is to be regarded as useful, as it is, of course, by this means that phagocytes and serum containing opsonins are brought through the diseased tissues to deal with the infecting bacteria.

The chronic conjunctivitis due to the diplo-bacillus usually gives way to treatment by zinc sulphate and correction of refractive error. Some obstinate cases require the use of vaccine, in doses of thirty to one hundred millions.

Ulceration of the cornea.

Staphylococcus.—Many cases of staphylococcal ulceration of the cornea cured by vaccine have been recorded. In my own experience, I have rarely found staphylococcus to be the primary cause of corneal ulceration, although it is frequently present as an added infection.

Pneumococcus is the cause of the usual variety of acute hypopyon-ulcer, often associated with disease of the lacrymal sac. Success depends on early treatment. Twenty-five millions of stock polyvalent vaccine should be given and a specific vaccine prepared as rapidly as possible. Fifteen millions of this may then be injected, and the dose repeated in three days or so, the treatment being regulated by estimations of the opsonic index and by clinical appearances.

Post-operative infection is so rarely seen now that it is perhaps unnecessary to dwell on it. However, I may say that such cases are eminently suited to vaccine treatment, and many eyes have been saved by this means. The most dangerous variety is that due to streptococcus. A stock polyvalent vaccine should be used, a dose of five millions being given immediately on the infection being recognised; meanwhile, a specific vaccine must be prepared and used, commencing with a dose of about three millions and gradually increasing it,

See THE OPHTHALMOSCOPE, Vol. VIII, 1910, p. 456.

according to indications furnished by the opsonic index and by clinical manifestations. Negative phases must be avoided by giving small doses frequently repeated.

In conclusion, let me say that I have had time to deal only with the more important diseases of the eye in which treatment by vaccine is applicable. I cannot even refer to many other branches of the subject, such as metastatic infections, which are suitable for vaccine treatment.

THREE CASES OF GONORRHŒAL IRITIS TREATED WITH ANTI-GONOCOCCAL SERUM.

BY

T. HARRISON BUTLER, M.D.OXON.

HON. OPHTHALMIC SURGEON TO THE COVENTRY AND WARWICKSHIRE HOSPITAL, AND TO THE WARNEFORD, LEAMINGTON, AND SOUTH WARWICKSHIRE GENERAL HOSPITAL.

GONORRHŒAL iritis is very common; it is often very severe and very chronic; and it is especially prone to immediate and late relapses. Cases may resist the orthodox treatment for weeks. Thus, recently I had a case of this form of iritis in my ward for over five weeks, and the patient began to make progress only when I followed the advice given by Dr. Eustace Smith, and put him on turpentine.* This remedy caused stranguary and intense bladder pain within twenty-four hours, but the eye began to improve at once. This may have been a coincidence, but the fact remains that rapid improvement commenced when turpentine was administered.

Any treatment which appears to make these chronic cases more amenable to therapeutic influence will be welcomed by ophthalmologist and patient alike. The very encouraging results which have followed the injection of anti-gonococcal serum on the only three occasions upon which I have used it, make me hope that we have now a potent means of influencing the disease for good. These three cases may be exceptionally favourable ones, but the results obtained have been so unexpectedly satisfactory that I do not hesitate to record them, in the hope that others will try the serum, and that its value may be positively determined.

CASE I.—Mrs. P., aged 29 years, consulted me because both her eyes were inflamed.

History.—Some weeks ago she first noticed a vaginal discharge, which is now very profuse. Her eyes have often been red and weak, especially just before her catamenia, but she has never had any severe inflammation. The present attack started seven days ago, both eyes commencing at the same time.

Present Condition.—R.V. = fingers at 1 metre. T.n. L.V. = fingers at 1 metre. T.n.

There is, in both eyes, severe ciliary injection. Both irides are muddy looking, the iris pattern is obscured, and the surface is covered with gelatinous threads. There are several posterior synechiæ. There is only a bare red reflex, and no view of the fundus can be obtained. The iris vessels are congested; there is some keratitis punctata. The aqueous humour is opalescent.

The patient was advised to go into Hospital at once, because the eyes were both severely inflamed.

After admission, films were made from the vaginal discharge, and they were found to be swarming with gonococci. The patient's husband had gonorrhœa also.

Treatment and Progress.—On *March 24th*, patient was admitted into the Warneford Hospital, Leamington. She was put to bed, and was ordered atropine drops three times a day, hot fomentations every two hours, and sodium salicylate, grs. xv, three times a day.

April 3rd.—The condition of the eyes has not much improved. There is still great injection and supra-orbital pain. The media are cloudy, especially on the left side. There is much lacrymation and photophobia. There is still some vaginal discharge, although this has been energeticaly treated by the house surgeon with 2 per cent. solution of silver nitrate. 2 c.c. of anti-gonococcal serum (Parke, Davis, and Co.) were injected subcutaneously in the forearm.

*See THE OPHTHALMOSCOPE, May, 1911, p. 384.

April 5th.—Both eyes are much better, the injection is less, and all subjective symptoms have disappeared. The pain has all gone. The patient is surprised that she has improved in so short a time.

April 7th.—The injection of serum was repeated.

April 8th.—The redness of the right eye has now almost disappeared, there is only slight circumcorneal injection of the lower one-third of the globe. The left eye is much less injected. There is no pain, no lacrymation, and no photophobia. Patient states that she sees very much better. The vaginal discharge has cleared up.

April 15th.—The whole inflammation has rapidly disappeared, and the eyes are now practically free from all redness. Patient discharged from hospital.

The second injection caused great irritation of the arm into which it had been made, and urticarial wheals appeared, which itched intensely.

April 19th.—There is now no injection whatever. Both pupils are fully dilated. R.V. and L.=6/9. The fundus is clearly seen in all its details; all vitreous opacity has cleared up. The precipitates on the back of the cornea have not yet become absorbed.

May 3rd.—No sign of synechiæ. Both pupils normal in size and shape and fully mobile. R.V. and L. = 6/6.

Case II.—A. W. H., age 31 years, male, consulted me on April 3rd, 1911, complaining that his left eye was red and painful.

History.—The left eye has been red, painful, and tender for eight days. Three months ago had an attack of gonorrhœa, which is now completely cured. Syphilis doubtful.

Present condition.—There is slight ciliary injection of the right eye, but no further signs of iritis. The left eye shows severe ciliary injection. There is great engorgement of the vessels of the iris, not only of the circulus minor but also of the radial vessels. The iris pattern is obscured, but no gelatinous material is seen on the iris or in the anterior chamber. There are small tags of exudate round the pupil, and some isolated posterior synechiæ. There is an exudate into the anterior part of the vitreous, and, in consequence, the fundus is but dimly seen. There is some pigmented keratitis punctata.

Treatment and progress.—Atropine and hot fomentations were ordered, and large doses of sodium salicylate were adminstered. R.V. 6/4·5. L.V. 6/36.

April 7th. The pupil is fully dilated, but the vitreous haze is even more pronounced, and the eye is very red and tender. Patient was advised to enter the Coventry and Warwickshire Hospital.

On admission, the orthodox treatment was adopted: atropine, hot fomentations, and rest in bed, but the eye showed no improvement. The injection became even more intense, and there was much photophobia and pain. There was more keratitis punctata.

April 7th.—Patient received an injection of 2 c.c. of Messrs. Parke, Davis, Co.'s anti-gonococcal serum.

April 9th.—The eye is remarkably better; there is less redness.

April 11th.—The injection was repeated.

April 14th.—The left eye is now rapidly recovering.

April 22nd.—The right eye is now becoming red again, and the pupil does not dilate with atropine.

April 30th.—The right eye is now almost as bad as the left was, and is resisting treatment, the left is again more injected, and some fresh synechiæ have formed.

May 1st.—2 c.c. of antigonococcal serum given.

May 3rd.—The right pupil has now fully dilated, and both eyes are much less injected.

May 10th.—Both eyes are almost free from injection, but there is still considerable keratitis punctata.

May 15th.—Patient was discharged from the ward.

May 17th.—There is hardly any injection of either eye. The right pupil is fully dilated, the left almost fully, there being only one small synechia. There is still a considerable pigmented precipitate upon Descemet's membrane, and there are a few spots of the "mutton fat" variety. The vitreous is clearing up, and the fundus is normal.

Remarks.—The first two injections had a very pronounced effect upon the disease, but it did not appear to be lasting, for the left eye relapsed slightly, and the right became inflamed. The last injection acted like a charm, the right pupil which would not dilate at once, within twenty-four hours of the injection became fully dilated, and the iritis rapidly lost its acute character. The second injection caused slight symptoms of serum disease—urticaria and some irritation of the skin.

Case III.—W. L., age 34 years, male, came to the Coventry Hospital on February 20th, 1911, complaining that his left eye was inflamed.

History.—Had an attacked of gonorrhoea during the past year. Six months ago, he had an inflamed left eye, and at the same time a painful arthritis of one knee. There is no family history of tuberculosis. Married 14 years, one child alive, lost one when 9 months old. His wife has had no miscarriages.

Present Condition.—Now has an acute iritis of the left eye. There is severe circumcorneal injection; the iris is muddy; and there is exudate in the pupillary area. There is no gelatinous material in the anterior chamber or on the iris. There is injection of the iris vessels.

Treatment and Progress.—Ordered atropine and hot fomentations.

Feb. 27th.—The iritis is much better; the pupil is fully dilated, and there is less injection. No keratitis punctata

March 6th—The eye is more inflamed then ever; the iris is œdematous, and the vitreous hazy. Atropine and fomentations continued.

March 13th.—No improvement. Still severe injection of eye.
March 22nd.—No improvement at all. An injection given of 2 c.cm. of Parke, Davis, and Co.'s anti-gonococcal serum.
March 27th.—There has been a wonderful improvement. The circumcorneal injection has almost cleared up, and all the pain has gone.

Remarks.—After this, the patient did not come again and was probably therefore finally cured. He expressed himself as suprised at the rapid improvement which set in within 48 hours of the injection of the serum. The change in the eye was just as rapid and marked as it was in Case I. This patient was treated as an out-patient.

It is worthy of note that anti-gonococcal serum, being made from a ram's blood, seems to be more likely to cause serum disease than the ordinary horse sera. At all events, two of my three cases had slight symptoms. It is better therefore to give both injections within a short interval and not to repeat the dose more than once.

WHAT ARE THE BEST MEANS TO ADOPT TO AVOID THE SPREAD OF THE FORMS OF OPHTHALMIA WHICH MAY LEAD TO BLINDNESS?*

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This question has been submitted by the Committee for discussion, and is a very large one. The measures vary in different lands. They depend on the climatic conditions of the country. They must be modified according to the stage of progress, material and mental, reached by the mass of the population. They must be altered to suit the different diseases which in different countries are productive of blindness. Their method of application is decided by the kind of sanitary administration existing in the country in question. And, finally, as a corollary to these considerations, where blindness has unfortunately resulted, is any system of education applicable to the majority of the sufferers in the country?

By whom the measures may be taken, the individual, societies, the Government.

Broadly speaking, the measures for the avoidance of the spread of the forms of ophthalmia which may lead to blindness can be adopted by the individual, by philanthropic societies, or by the government of the central or local country.

In every country it is the individual who has most control over the ophthalmic destiny of himself and of his family. The control may not necessarily be complete; it may be modified by poverty, which compels him to live in unhealthy surroundings or to engage in an occupation which is of danger to the eyes. He may be drafted into the army by conscription or condemned to a term of imprisonment, when he may be compelled to live in intimacy with people who are infected with contagious ophthalmias.

Societies for the diffusion of a knowledge of ophthalmic hygiene have, in European countries, done much to diminish the incidence of ophthalmia neonatorum. Governments have assisted in the suppression of the same

* A communication read at the Fourth International Congress for the Amelioration of the Lot of the Blind, Cairo, 1911.

disease by insisting on a qualification for midwives, and compelling them to call in a surgeon when the condition of the mother or the child demands it. Segregation of those infected with trachoma has been recommended and carried out in some cases, though never thoroughly. The possibility of segregation depends upon the community being a small one, and on their being only a small proportion of people infected with the disease. In London, children infected with trachoma are eliminated from the Poor Law schools, and educated together in special school hospitals.

Modification of measures for the avoidance of ophthalmia, which may lead to blindness, by the physiographical condition of the country, the character, custom, and degree of education of the people, and by the causes of blindness most prevalent.

Eternal controversies have raged with reference to the influence of climate on trachoma, whether the inhabitants of a damp low-lying situation are not more liable to infection than those who live at a higher altitude, where there is less humidity. These factors are now recognised to be of no importance. The incidence of trachoma and other ophthalmias depends on the presence of the infective agent, and on any causes which lead to conjunctival irritation, such as strong winds and dust. A high temperature also favours the growth of many bacterial organisms which attack the eye. These physiographical conditions are very little susceptible of modification by any measures.

Habits of personal cleanliness are probably the most powerful deterrents of ophthalmias, as well as the most difficult to teach. The teaching in schools of ophthalmic hygiene is useful, provided what is taught is of practical application. But it is generally adapted for a social class far above that to which it is addressed. Prophylaxis consists in frequent ablutions, and in the possession by the individual of his own washing materials, linen, and bed, which are kept exclusively for his use.

In schools, all pupils with a discharge from the eyes should be rigidly excluded. When a few pupils only have trachoma, they should be isolated from the healthy pupils. But as in Egypt there are only a few pupils who have not got trachoma, they should, where possible, be taught separately.

The most frequent cause of blindness in European countries is ophthalmia neonatorum, a cause which can be abolished in any civilised country by the use of proper precautions by midwives and obstetricians. Consanguineous marriages, which in the United States of America are responsible for 4·5 per cent. of the total blindness, are strictly under the control of the individuals and of the community. Small-pox as a cause of blindness is very frequent in countries which have not yet adopted compulsory vaccination, or which have only recently done so. Certain trades are dangerous to the eye, but most of them can be made innocuous by the use of protective goggles. Syphilis is responsible, directly or indirectly, for much blindness, but its terrors have been greatly reduced since the discovery of "salvarsan"; and with compulsory notification and treatment, blindness from this cause might be reduced still further. I have left to the end of this list of the more important causes of blindness, trachoma, and acute ophthalmias.

Trachoma having once become endemic in a country, and affecting a large proportion of the inhabitants, cannot be extirpated by any means at present known. It therefore behoves countries where the disease is not yet widely spread, to consider means for the isolation of those who are infected, and for the exclusion of infected immigrants.

In countries already thoroughly infected with trachoma, blindness may be prevented if efficient surgical treatment is available. The establishment of

small local ophthalmic hospitals, where free treatment for the poor is provided, is therefore essential.

Acute ophthalmias are met with most commonly in warm climates, especially in those countries where violent winds at times drive about sand or dust. Short of depopulating these countries, there is no means of preventing blindness from these causes. The dust in large cities is a trifling cause of the total amount of acute ophthalmia. For a comparatively small sum it may be prevented, by watering the roads, from annoying the inhabitants of the richer quarters of the town, except during severe gales of wind. In the unpaved quarters of cities, where the poorer classes live, watering of the streets sufficient to keep down the dust is probably productive of more physical harm than the presence of dry dust.

Egypt: its causes of blindness, its social and physiographical condition.

The commoner causes of blindness in Egypt at the present time are acute ophthalmias, trachoma, and glaucoma.

Acute ophthalmias are a group of contagious diseases which have seasonal variations of virulence, the increase beginning with the onset of warm weather in April and May of each year, when the temperature has been reached at which the bacterial organisms, causative of the conditions, multiply with enormous rapidity. When the temperature falls in the autumn, acute ophthalmias diminish, so that in the winter they are rarely seen. It is supposed that ophthalmia neonatorum as a cause of blindness is much less frequent in Egypt than in European countries, but it is exceedingly hard to obtain reliable information. Midwives usually deny that it occurs at all, fearing that punitive measures will be taken against them if they admit having had cases among their *clientèle*.

Trachoma is also a contagious disease, but is entirely chronic in its course. Being practically universal in Egypt among all except the highest classes, it accompanies every other disease of the eye except occasionally in very young children who have as yet escaped infection.

Glaucoma, a disease unaccompanied by the signs of inflammation, is probably more common in Egypt than in any other country in the world. It is probably the result of the hereditary transmission of such anatomical peculiarities as lead to the disease.

This disease accounted for 21 per cent. of the cases of blindness seen among 91,917 patients examined by me and my assistants during the four years 1907 to 1910. In other words, 1·4 per cent. of all the patients who presented themselves at the hospitals for treatment were blind in both eyes from glaucoma.

GLAUCOMA.

	Total of patients examined.	No. of patients blind in both eyes from any disease.	No. of patients blind in both eyes from glaucoma.
1907	24,416	2,010	221
1908	19,614	852	253
1909	22,373	1,385	359
1910	25,514	2,010	488
	91,917	6,257	1,321

BLINDNESS.

Year.	Total No. of Patients examined.	One eye.		Both eyes.		One eye and both eyes.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.
1906	40,103	1,297	3.2	663	1.6	1,960	4.9
1907	24,416	1,450	5.9	697	2.8	2,147	8.7
1908	19,614	1,189	6.	852	4.3	2,041	10.4
1909	22,373	2,116	9.4	1,385	6.1	3,501	15.6
1910	25,506	2,438	9.5	2,010	7.8	4,448	17.4
Total ...	132,012	8,490	6.4	5,007	4.2	14,097	10.6

Many other causes, of course, contribute towards the grand aggregate of blindness in Egypt, but the above are the principal ones. The number of people blind in both eyes at the time of the census of 1907 was 148,280, or 1.3 per cent. of the population, and it was officially announced by the census authorities that this number was probably much understated. Those blind in one eye only were stated to be 363,702 or 3.2 per cent. of the population.

From an examination of 132,000 patients by me and my assistants during the last five years, it was found that 4.2 per cent. were blind in both eyes, and 6.4 per cent. were blind in one eye.

It is, in my opinion, quite untrue to say that there is less blindness now than there was fifteen or twenty years ago, for various reasons which I discussed in a communication to the International Medical Congress at Budapest, 1909.

It is popularly believed that flies, in combination with dirt, are the principal means of propagation of eye disease; but, is stated in Boldt's monograph on trachoma, in the preface to the English edition by Treacher Collins: "probably in a country like Egypt, one of the most frequent ways by which infection is carried, is by the fingers." Another surgeon, with a large experience of the East, states, "infection can be traced almost invariably to manual contact. Flies alighting on infective matter are capable of carrying it to some other suitable nidus, but they seldom if ever enter the conjunctival sac of normal eyes" (Kenneth Scott). It therefore appears from these authorities that flies are not the principal means of propagation of eye disease, and I am in agreement with them.

Trachoma and acute ophthalmias are allies in the destruction of sight in Egypt. The presence of either disease facilitates contagion by the other, as well as being an augmentation of its danger. Irritation of the lining membranes of the eye is usually the first step. The uncleanly habits of the lower classes—habits in some cases consecrated by custom, and in others aggravated by the difficulty in obtaining water—the crowded huts, with crumbling mud walls, in which the poorer fellahins leep together with their cattle; the dust of the streets, unpaved and unwatered except in the larger towns, continually ground to powder by the trampling of the cattle which are driven daily from the huts to the fields; the gales of daily occurrence during some periods of the year, which drive the dust about until it permeates the atmosphere even within the most hermetically sealed house; all these are fertile causes of acute

ophthalmias. The way in which an acute ophthalmia facilitates the spread of trachoma is by adding a copious discharge, through the agency of which trachoma is spread by means of the fingers, garments, handkerchiefs, or towels.

Trachoma, if not recognised at the onset of an acute ophthalmia in an Egyptian, is usually found during his convalescence.

The members of the upper classes among the Egyptians usually become infected by their servants at an early age, even although their parents are unaffected.

Measures which may be taken for the avoidance of ophthalmias, which may lead to blindness, in Egypt.

The better education of midwives (*Dayas* and *Hakimas*), would, without doubt, diminish the incidence of blindness among infants. The multiplication of children dispensaries, on the lines of the first one started in this country by Lady Cromer, would also be of great use. At these dispensaries, an English nurse treats the minor ailments of childhood, and advises the mother generally. The majority of the cases seen are ophthalmic.

The infant schools of Egypt (the *Kuttabs*), over which the Government has, in the majority of cases, but small control, and in the others no control at all, are, except those which have been recently constructed, totally unfitted as places of instruction. Insanitary and over-crowded may be charged against the majority of them. If they were all rebuilt, with sufficient air space per pupil, it would at least give a child with healthy eyes a chance of escaping the contagion of trachoma. The Ministry of Education is perfectly alive to these conditions, but is powerless in the matter. As I inspect every year, from an ophthalmic point of view, the *Kuttabs* of Tanta and Assiut, I have every opportunity of knowing the actual conditions. Under present conditions, no ophthalmic treatment could be undertaken with satisfactory results.

At the primary schools, there should be ophthalmic treatment arranged exactly as that now carried out by my department at Tanta School, but it should be made compulsory on all the pupils. This school treatment, however, is exceedingly difficult work, requiring considerable experience, as well as tact.

At the secondary schools, the pupils should have the opportunity of first-class ophthalmic advice at least twice a week.

The colleges for the training of teachers, for both schools and *Kuttabs*, should have the advantage of treatment similar to the secondary schools, for it is most important that teachers themselves should be imbued with a belief in the value of ophthalmic hygiene.

Something might be done in the way of lecturing on the importance of cleanliness, and of simple hygienic precautions, to collections of people which regularly congregate outside hospitals, markets, etc. Work of such a type should be undertaken by a society without any connection with the Government. The distribution of pamphlets on ophthalmic hygiene will shortly be commenced in Egypt. The provision, at a cheap rate, of some reliable eye-drops, which can be obtained in any government pharmacy in Egypt, has also been begun.

The above are serious proposals, and can be undertaken gradually during the next fifty years. Suggestions for rehousing the rural population, for the abolition of all *sebakh* deposits, the sufficient watering of streets in villages to keep down dust, all these, although advantageous from an ophthalmic point of view, would be ludicrous economically.

The organisation at present in existence for the prevention of blindness.

One is driven to the conclusion that the prevention of ophthalmias at the present day is impossible. It is conceivable that the future will, on the lines I have laid down, or by new inventions, permit direct measures to be taken for the avoidance of the forms of ophthalmia which may lead to blindness. But now our attention should be directed towards the prevention of the complications and sequelæ of the ophthalmias.

An enormous amount can be done with comparatively small expenditure, and in very short time, say, about ten years.

Whatever is done should be in connection with the present ophthalmic organization of the Egyptian Government, which I will briefly describe.

There are now in seven of the fourteen provinces of Egypt, either in existence or in the course of construction, permanently built ophthalmic hospitals, each of which is now provided at a cost of £4,000 or £5,000, locally, by gift of an individual, by subscription among the notables, or by grant from the budget of the council of the province. The money is handed over to the Government which builds, equips, maintains (pays all general yearly expenses), and administers an ophthalmic hospital.

It is hoped that four or five of the remaining provinces will find the money necessary for a permanent hospital.

There are, in addition, two large travelling hospitals, each consisting of ten large tents, which visit various large centres for six months at a time.

The average number of patients treated at each of these hospitals is 225 per day, and the average number of operations performed is 13 per day. It is usually impossible to cope with the number of new patients who present themselves for treatment, and large numbers are daily sent away.

Detailed scheme for the development of the present organisation.

It is, then, hoped that within about ten years there will be in Egypt twelve permanent hospitals and two travelling hospitals, or one for each of the fourteen provinces.

But such a scheme, although it seemed chimerical enough five years ago, is seen on examination to be quite insufficient for the needs of the country.

The hospital is situated in the principal town of the province. But in each province there are, roughly, six police districts, or *merkazes*, each with an average population of 120,000 persons, and some of these are twenty or thirty kilometres from the hospital.

Even if the scheme I am about to describe, of a travelling hospital in each *merkaz*, were immediately put into existence, I calculate it would be twenty years before all the people with defective eyes could be seen.

There should be in every *merkaz* or police district a travelling hospital, each having, as its base, the permanent hospital in the capital town of the province.

The clinical work at the travelling hospital would be mainly the treatment of trachoma and its sequalæ, and in the warmer weather, of acute ophthalmias.

The cost of equipment of a small travelling hospital would be £E400, and the cost of maintenance £E800 a year. In provinces where there was no permanent hospital, one of the existing large travelling hospitals or a similar one could act as a base. Exceptionally, a small travelling hospital might act without a base at an increased cost per annum of £E300 a year; this increased cost being necessary for the provision of a second surgeon and of accommodation for a few in-patients.

Where the money is to come from for such a scheme is doubtful. There

are only three possible sources, however; one is from subscription, another from the general budget of the Egyptian Government, and the other from the budget of the council of each province. In the majority of provinces the expense could be borne without difficulty by the budget of the council of each. In any case the scheme would take very many years to complete, owing to the necessity of training in ophthalmic surgery a sufficient number of Egyptian surgeons who have obtained their diplomas at the Government Medical School of Kasr El Ainy.

Two conditions must be laid down as essential to the success of such a scheme—one is the efficient training of the surgeons who carry on the clinical work, without which more harm than good would be done by the scheme, and the other is the efficient administrative and clinical control by the ophthalmic section of the Public Health Department.

With an organization such as has been described, the ophthalmic staff of a future generation, instead of performing an unending series of operations for the relief of disease already contracted, might look forward to the adoption of measures for the prevention of the incidence of ophthalmias. But no preventive measures can ever be applicable in Egypt, even in future ages, until the ocular disabilities of millions of Egyptians, remediable by simple operation or treatment, are relieved as the result of the establishment of hospitals all over the country. When a parent's eyes are exceedingly painful or defective, he or she will not appreciate any detail of ophthalmic prophylaxis on behalf of his child.

The scheme that has been outlined is not a Utopian suggestion. It is a practical scheme, the detail of which we understand and which has been seriously considered and adopted as a workable policy by the Public Health Department.

Comparative value of care for, and education of, the blind in Egypt and other countries.

A communication appeared in *La Bourse Égyptienne* a short time ago, as follows:—

"La fondation d'un vaste établissement scolaire pour l'éducation des aveugles s'impose donc en Egypte."

There are in Egypt, according to the 1907 census, 148,280 blind persons of both sexes. This number is low, and for accuracy should probably be doubled. But for purposes of argument we will take it as correct. Now, a period of six years is the minimum time required for the education of a blind child, and the school years would be from ten to fifteen years inclusive.

What proportion of the 148,000 blind people in Egypt are between the ages of ten and fifteen years inclusive?

In the 1907 census it was found that for every 100,000 of the population there were 16,142 boys and 11,760 girls, or 27,902 of both sexes, roughly 28,000. Calculating from these data we find that among the 148,000 blind there are 39,760 blind children between the ages of ten and fifteen years inclusive.

When, therefore, the question of any scheme for the education of the blind is discussed, it must be remembered by those whose duty it is to consider the ultimate cost of any scheme for the furtherance of civilization, that there are more than 39,000 blind children at the present time in the country of an educable age. In connection with which two points may be remembered, one is the cost per pupil at the primary schools to the Egyptian Government, which is £E6.473 mill. per year; and the other is the cost per pupil in the existing blind school at Zeitoun which is about £E28 a year.

The cost per year at any newly-established blind school would be an unknown sum between these figures.

Any wide-spread charitable scheme for providing new blind schools is open to considerable criticism on account of the large number of blind children (39,000) from whom pupils would have to be chosen.

It appears to many, that those Egyptians whose hearts are melted with pity for the blind, would do better to assist with their money, schemes for the prevention of blindness, rather than schemes for the relief of those already blind.

The Ministry of Education, however, is fully aware of the needs of the blind children in the *kuttabs* or infant schools. In those which are inspected by the Government, there were in 1910 :—184,486 boys, of whom 1,185 were totally blind, and 22,094 girls, of whom 417 were totally blind. In other words, out of 206,580 children of both sexes in the Egyptian infant schools there were 1,602 who were totally blind, or 0.7 per cent.

The Ministry of Education has been considering for some time the possibility of providing in the chief town of each province an institution for teaching the blind. With the help of the Provincial Councils, it is hoped that something may be done in the course of time. It is possible that in connection with this scheme the existing blind school at Zeitoun may enlarge its sphere of usefulness. This school was founded ten years ago by an English lady, and admits boys of any religious persuasion. Besides a useful general education, a trade is taught, which, in a certain number of cases, enables the pupils to become self-supporting.

For the Moslem pupils recitation of the Koran is made a speciality, whereby a living may usually be gained after a pupil's discharge from the school. The Christian pupils also are educated in the tenets of their own religion. The total expenses of the school, which is supported by voluntary contributions, are about £E1,500 a year. For this sum fifty boys are educated, of whom about forty receive free board and lodging at the school.

There is a similar school, under different management, but doing equally good work, at Alexandria.

It is hoped that one of the results of this Congress will be the assistance by donations and subscriptions of the excellent work carried on at these two institutions.

POSTSCRIPT.—*The Provincial Council of Gharbia, the largest of the fourteen provinces of Egypt, has marked an epoch of progressive thought in Egypt by voting the necessary sum for the establishment and maintenance of a small travelling hospital in that province. It will be administered by the Chief Inspector of Ophthalmic Hospitals, acting as the technical adviser of the Council. This hospital is just about to commence work.*

FUCHS' COLOBOMA AND ASTIGMATISM.

BY

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SOME difference of opinion exists with regard to the true explanation of the appearances seen at the disc and in the fundus in cases of Fuchs' "coloboma" or "congenital inferior crescent," one set of observers affirming that the grey or white crescent present below the disc really represents a minimal type of coloboma of the choroid.

Elschnig, however, from anatomical and microscopical examination of three cases, found appearances practically indistinguishable from those seen in myopia, and regards them as produced much in the same way, *viz.*, by stretching of the ocular tunics at the posterior pole and consequent pulling away of the choroid from the disc margin. This stretching he ascribes to some developmental weakness or want of consolidation of the tissues in the line of the fœtal cleft, which permits of their giving way before the normal intra-ocular tension. Clinically, it would seem to the writer that this theory is probably the correct one, since it fits in more closely with the observed facts.

The macular area, although not directly involved in this stretching, may yet secondarily be affected from proximity to the weakened region below and a condition of asymmetry may develop to which the term "fundal astigmatism" has been applied.

This term, however, should be abandoned as very misleading from the clinical point of view, since an image falling on such a retina is distorted not astigmatic and therefore not amenable to correction in any degree by means of a cylindrical lens placed in front of the eye—a fact of great importance when we come to the results of subjective verification.

This macular distortion in typical cases doubtless accounts for the well-known fact that the visual acuity, despite correction, remains considerably below normal, although, on the other hand, it must be noted that in the less marked cases at least, as will be seen from those reported later, the condition is not incompatible with practically full vision.

True astigmatism, of greater or less degree, is almost invariably associated with these cases, and it was to discover the relationship, if any, existing between the two conditions that the following investigation was undertaken.

The present paper deals with the clinical study of thirty cases of this nature which have come under the writer's observation at Moorfields during the past eighteen months in the clinics of Messrs. G. Coats and M. L. Hepburn, to whom I am greatly indebted for permission to publish these brief notes. The method adopted was retinoscopy under a mydriatic for the determination of the total refraction, the results being afterwards carefully verified by subjective testing.

Corneal astigmatism was investigated by means of a Sutcliffe keratometer. Any pronounced difference in the results must necessarily be ascribed to lenticular astigmatism.

The system of axis notation given is that authorised by the Optical Standards Committee of the Optical Society (see THE OPHTHALMOSCOPE, 1909, p. 671).

The results of subjective testing are included under the heading "Retinoscopy," and represent in each case the lenses required to obtain the maximum degree of visual improvement.

Astigmatism was found to be present in greater or smaller degree in all the eyes affected, and in the large majority (63·6 %) was made up of combined corneal and lental astigmatism. In some (22·7 %) the astigmatism seemed to be wholly corneal, and in the remainder (13·6 %) wholly lental in character.

In those cases where both corneal and lental astigmatism co-existed in the same eye, the axes, as determined by the above methods, were found to be practically coincident, thus probably pointing to a common source of origin. Further, a careful comparison of the tabulated results shows a remarkable correspondence between the meridian of greater refraction, *i.e.*, the more myopic or less hypermetropic, and the direction of fundal stretching.

To accentuate this point and enable results to be seen at a glance this *a* meridian has been separated and accorded a separate column in the table of cases.

As indicating the direction of fundal stretching, the position of the crescent, and perhaps still more so the primary direction of the vessels on the disc, are all important. The "site of election" of the crescent is below and somewhat to the nasal side of the disc.

In twenty-eight of the eyes affected (63·6 per cent.) this corresponds to an *a* meridian of 110° and 90° in the right eye or between 70° and 90° in the left eye, and may therefore be taken as representing the usual direction of the fœtal ocular cleft.

The crescent, however, may be shifted more nasally and, indeed, come to occupy a purely nasal position, the vessels at the same time in the latter case being strongly directed inwards.

In six eyes (13·6 per cent.) the *a* meridian was found to be between 110° and 140° in the right eye, or between 40° and 70° in the left eye, and in five eyes (11·3 per cent.) where the position of the crescent was noted to be nasal, the astigmatism became "inverse," and the *a* meridian more or less horizontal.

This latter group of cases, though few in number, because relatively rare, is extremely important as showing clearly the relationship between fundal stretching and stretching at the anterior pole inducing corneal astigmatism.

The acorneal or lental astigmatism may be due, as suggested to the writer by Mr. A. S. Percival, either to tilting of the lens or to toric curvature induced by relaxation of that part of the suspensory ligament taking origin from the ciliary body adjacent to the stretched fundal area. The latter would seem to be the more probable explanation.

In two eyes (4·5 per cent.) the position of the crescent was somewhat infero-temporal, the axis of the *a* meridian in one case being 60° and in the other 70°. In one remarkable case, the condition was bilateral but the crescents were superior, the astigmatism being "with the rule"—the axis of the *a* meridian in the right eye 110° and in the left 70°

Ophthalmoscopically, the chief points of interest centre in the appearance of the disc itself, the size and position of the crescent, the direction of the main vessels, and the appearance of the fundus in its lower and inner part. In a typical case the disc proper appears to be oval horizontally because seen foreshortened in the horizontal plane; the white or grey crescent apparently forming part of the disc area is yet limited from it by a line representing the exposed margin of the sclerotic which also encroaches to a greater or lesser extent on the fundus below.

The primary direction of the vessels is downward, the lower branches continuing thus, but the upper soon curve sharply upwards over the disc margin to gain the fundus.

In the case above alluded to, where the crescents were superior, the vessels presented the remarkable appearance of being shot vertically from the disc, the lower branches then curving sharply downward to be distributed to the fundus.

When the crescent is nasal in position, the disc is seen foreshortened in the vertical plane and the vessels primarily are directed strongly inwards.

These typical cases are relatively rare; but nevertheless a large number of cases unquestionably of this nature occur in which the appearances noted above are less marked in degree, and which may be, and indeed frequently are, passed by unnoticed unless carefully sought for.

A very constant feature of all is the bleached or semi-albinotic state of the fundus in its lower and inner part. This was observed in all the cases, and probably owes its origin to some lack of pigmentation in the layer of hexagonal epithelium of the retina and attenuation of the choroid due to stretching.

No.	Name, etc.	Retinoscopy.	Corrected Vision	Crescent.	Corneal Vertical	Vertical Axis	Meridian.
1	S. L. Male, age 28 V.R. <1/6 V.L. <1/6	R. —3·5 D. sph. c. —2 D. cyl. hor. L. —3·5 D. sph. c. —2·5 D. cyl. 150°	R. c. gl. 1/6 nly. L. c. gl. 1/6 ptly.	R. Inferior L. Infero-temp.	R. 2 D. L. 2·5 D.	R. Nasal L. Nasal	R. Vert. L. 60°
2	P. M. Male, aged 15 V.R. 1/12 V.L. 1/6	R. +1·5 D. sph. c. +2·5 D. cyl. 100° L. —·5 D. sph. c. +4 D. cyl. vert.	R. c. gl. 3/6 nly. L. c. gl. 3/6 ptly.	R. Infero-nasal L. Inferior	R. 2·5 D. L. 3·5 D.	R. None L. 5 D.	R. 100° L. Vert.
3	M. M. Male, age 13 V.A. 6/6 V.L. 6/6 ptly.	R. —·5 D. sph. c. +3·5 D. cyl. 80° L. +3 D. sph. c. +3 D. cyl. vert.	R. c. gl. 5/6 L. c. gl. 5/6 ptly.	R. No crescent L. Inferior	R. 3·5 D. L. 1 D.	R. None L. 2 D.	R. 80° L. Vert.
4	L. G. Male, age 20 V.R. 6/6 V.L. 6/6	R. +·5 D. cyl. 110° L. —5·5 D. sph. c. —2 D. cyl. 70°	R. c. gl. 6/6 L. c. gl. 6/6	R. No crescent L. Nasal	R. ·5 D. L. ·5 D.	R. None L. 1·5 D.	R. 110° L. 160°
5	L. G. Female, age 35 V.R. 6/18 V.L. 6/12	R. +2 D. sph. c. +1·5 D. cyl. 30° L. +·5 D. sph. c. +3 D. cyl. 70°	R. c. gl. 6/6 L. c. gl. 6/6 ptly.	R. No crescent L. Infero-nasal	R. ·5 D. L. 3 D.	R. None L. None	R. 30° L. 70°
6	L. A. W. P. Male, age 18 V.R. 6/12 V.L. 6/6	R. +5 D. sph. c. +3 D. cyl. 140 L. +1 D. sph.	R. c. gl. 6/6 L. c. gl. 6/6	R. Infero-nasal L. No crescent	R. 1 D. L. None	R. 2 D. L. None	R. Ax. 140° L.
7	B. S. Male V.R. 6/18 V.L. 6/24	R. —2 D. sph. c. —2 D. cyl. 20° L. —2 D. sph. c. —3·5 D. cyl. 160°	R. c. gl. 6/6 ptlv. L. c. gl. 6/6 ptly.	R. Infero-nasal L. Infero-nasal	R. None L. 2 D.	R. 2 D. L. 1·5 D.	R. 110° L. 70°
8	D. E. Male, aged 10 V.R. 6/12 V.L. 6/6	R. —5 D. sph. c. —2·5 D. cyl. hor. L. +1 D. sph.	R. c. gl. 6/6 L. c. gl. 6/6	R. Inferior L. No crescent	R. None L. None	R. 2·5 D L. None	R. Vert. L.
9	L. R. Male, aged 20 V.R. 6/18 V.L. 6/24	R. +3 D. sph. c. —3·5 D. cyl. 100° L. +3 D. sph. c. —4 D. cyl. hor.	R. c. gl. 6/6 ptly. L. c. gl. 6/6 ptly.	R. Infero-temp L. Inferior	R. 3·5 D. L. 4 D.	R. None L. None	R. 70° L. Vert.
10	R. E. Female aged 10 V.R. 6/30 V.L. 6/30	R. —4·5 D. sph. c. —2·5 D. cyl. hor. L. —5·5 D. sph. c. —2·5 D. cyl. hor.	R. c. gl. 6/6 L. c. gl. 6/6	R. No crescent L. Inferior	R. 2·5 D. L. 1·5 D.	R. None L. 1 D.	R. Vert. L. Vert.
11	W. F. Male, age 13 V.R. 6/30 V.L. 6/6	R. —7·5 D. sph. c. —1·5 D. cyl. 10 L. —5·5 D. sph. c. —1·5 D. cyl. 165	R. c. gl. 6/6 L. c. gl. 6/6 ptly.	R. Inferior L. Infero-nasal	R. 1·5 D. L. 1·5 D.	R. None L. None	R. 100° L. 75°
12	H. H. Male, age 11 V.R. 6/18 V.L. 6/6	R. +·5 D. sph. c. —2·5 D. cyl. 20° L. —5 D. sph. c. —4 D. cyl. 160°	R. c. gl. 6/6 ptly. L. c. gl. 6/6 ptly.	R. Inferior L. Infero-nasal	R. 1·5 D. L. 3 D.	R. 1 D. L. 1 D.	R. 110° L. 70°
13	L. M. Male, age 9 V.R. 6/12 V.L. 6/24	R. +5·5 D. sph. c. +2 D. cyl. 110° L. +5 D. sph. c. +2·5 D. cyl. 70°	R. c. gl. 6/6 ptly. L. c. gl. 6/6 ptly.	R. Infero-nasal L. Infero-nasal	R. 2 D. L. 2·5 D.	R. None L. None	R. 110° L. 70°
14	E. P. Female, age 20 V.R. 6/24 V.L. 6/24	R. +2 D. sph. c. —3·5 D. cyl. 160° L. —3·5 D. cyl. hor.	R. c. gl. 6/6 L. c. gl. 6/6	R. Inferior L. Inferior	R. 2 D. L. 2·5 D.	R. 1·5 D. L. 1 D.	R. 70° L. Vert.
15	S. C. Female, age 55 V.R. 6/36 V.L. 6/36	R. —2·5 D. cyl. hor. L. —·5 D. sph. c. —1·5 D. cyl. hor.	R. c. gl. 6/6 L. c. gl. 6/6	R. Inferior L. Inferior	R. No appr'ci'ble L. No appr'ci'ble	R. 2·5 D. L. 1·5 D	L. Vert. L. Vert.
16	V. B. Female, age 14 V.R. 6/6 L.R. 6/6	R. —1 D. sph. c. —1·5 D. cyl. 20° L. —1·5 D. sph. c. —·5 D. cyl. 170°	R. c. gl. 6/6 nly. L. c. gl. 6/6 ptly.	R. Inferior L. No crescent	R. No appr'ci'ble L. ·5 D.	R. 1·5 D. L. None	R. 110° L. 80°

No.	Name, etc.	Retinoscopy.**	Corrected Vision.	Crescent.	Corneal Astig.**	Acorneal Astig.	Meridian.**
17	A. T. Female, age 14 V.R. $\frac{6}{6}$ V.L. $\frac{6}{12}$	R. +1 D. sph. L. +1 D. sph. c. +1 D. cyl. 80°	R. c. gl. $\frac{6}{6}$ L. c. gl. $\frac{6}{6}$ nly.	R. No crescent L. Inferior	R. None L. No appr'ci'ble	R. None L. 1 D.	R. L. 80°
18	V. H. Female, age 22 V.R. $\frac{6}{18}$ V.L. $\frac{6}{6}$	R. +2·5 D sph. c. 3·5 D. cyl. 15° L. +1 D. sph.	R. c. gl. $\frac{6}{12}$ ptly. L. c. gl. $\frac{6}{6}$	R Inferior L. No crescent	R. 2 D. L. None	R 1·5 D. L. None	R. 105° L.
19	G. R. Female, age 13 V.R. $\frac{6}{18}$ V.L $\frac{6}{18}$ ptly.	R. ·5 D. sph. c. +4 D. cyl. 120° L. ·5 D. sph. c. +4·5 D. cyl. 60°	R. c. gl. $\frac{6}{9}$ nly. L. c. gl. $\frac{6}{9}$ nly.	R. Infero-nasal L. Infero-nasal	R. 2·5 D. L. 2·5 D.	R. 1·5 D. L. 2 D.	R. 120° L. 60°
20	E. S. Female, age 52 V.R. $\frac{6}{36}$ V.L. $\frac{6}{6}$	R. +2·5 D. sph. c. +3 D. cyl. 110° L. +4 D. sph. c. +1 D. cyl. 70°	R. c. gl. $\frac{6}{6}$ L. c. gl. $\frac{6}{9}$ ptly.	R. Inferior L. No crescent	R. 1·5 D. L. 1 D.	R. 1·5 D. L. None	R 110° L. 70°
21	I. E. Female, age 14 V.R. $\frac{6}{24}$ V.L. $\frac{6}{18}$	R. +·5 D. sph c. −3·5 D cyl. 20° L. +2 D. sph. c. −3·5 D. cyl. 155°	R. c. gl. $\frac{6}{9}$ nly. L. c. gl. $\frac{6}{12}$ ptly.	R. Infero-nasal L. Infero-nasal	R 2 D. L. 3 D.	R. 1·5 D. L. ·5 D.	R. 110° L. 65°
22	C. L. Male, age 40 V.R. $\frac{6}{36}$ V.L *	R. c. −1 D. sph. c. −3 D. cyl. 30°	R. c. gl. $\frac{6}{6}$	R. Infero-nasal	R. 1 D.	R. 2 D.	R. 120°
23	F. H. Male, age 50 V.R. $\frac{6}{6}$ V.L. $\frac{6}{36}$	R. Emmetropic L. 3·5 D. sph. c. −2 D. cyl. 100°	R. Emmetropic L. c. gl. $\frac{6}{12}$	R. No crescent L. Inferior	R. None L. 1 D.	R. None L. 1 D.	R. L. 70°
24	E. G. Female, age 48 V.R. $\frac{6}{36}$ V.L. $\frac{6}{36}$	R. −3 D. sph. c. 2·5 D. cyl. 20 L. −4·5 D. sph. c. 2 D. cyl. 160°	R. c. gl. $\frac{6}{36}$ † L. c. gl. $\frac{6}{6}$	R. No crescent L. Inferior	R. Not noted L. ·75 D.	R. L. 1·25 D.	R 110° L. 70°
25	S. M. Female V.R. $\frac{6}{18}$ V.L. $\frac{6}{24}$	R. +2·5 D. sph. L. +2·25 D. cyl. 60°	R. c. gl. $\frac{6}{6}$ L. c. gl. $\frac{6}{9}$ ptly.	R. No crescent L. Infero-nasal	R. None L. 1 D.	R None L. 1·25 D.	R L. 60°
26	C. C. Male, age 16 V.R. $\frac{6}{9}$ V.L. $\frac{6}{36}$	R. +3 D. cyl. 140° L. −3 D. sph. c. −5 D. cyl. hor.	R. c. gl. $\frac{6}{9}$ ptly. L. c. gl. $\frac{6}{36}$	R. Infero-nasal L. No crescent	R. 1 D. L. Not noted	R. 2 D. L.	R. 140° L. Vert.
27	S. H. Female, age 36 V.R. $\frac{6}{60}$ V.L. $\frac{6}{36}$ ‡	R. −4 D. sph. c. −5·5 D. cyl. 20° L. −3·5 D. sph. c. −5·5 D. cyl. 160°	R. c. gl. $\frac{6}{24}$ L. c. gl. $\frac{6}{24}$	R. Superior L. Superior	R. 3·5 D. L. 3·5 D.	R. 2 D L. 2 D	R. 110° L. 70°
28	D. C. Female, age 10 V.R. $\frac{6}{18}$ V.L. $\frac{6}{36}$	R. +1·5 D. cyl vert. L. 1·5 D. sph. c. +4·5 D. cyl. vert.	R. c. gl. $\frac{6}{6}$ L. c. gl. $\frac{6}{18}$	R. No crescent L. Inferior	R. Not noted L. 3 D.	R. L. 1·5 D.	R. Vert L. Vert.
29	D. G. Female, age 14 V.R. $\frac{6}{36}$ V.L. $\frac{6}{36}$	R. 1 D. sph. c. 4 D. cyl. hor. L. −4·5 D. cyl. 110°	R. c. gl. $\frac{6}{9}$ ptly. L. c. gl. $\frac{6}{18}$	R. Inferior L. Nasal	R. 2 D. L. 4 D.	R. 2 D. L. ·5 D.	R. Vert. L. 20°
30	G. H. Male, age 35 V.R. $\frac{6}{24}$ V.L. $\frac{6}{36}$	R. −1 D. sph. c. 1·5 D. cyl. 95° L. −3 D. sph. c. 1 D. cyl. 60°	R. c. gl. $\frac{6}{12}$ nly. L. c. gl. $\frac{6}{18}$ ptly.	R. Nasal L. Nasal	L. 1·5 D. R. ·75 D.	R. None R. ·25 D.	R. 5° L. 150°

* L. eye lost as result of injury. † R. eye was the subject of advanced retinitis pigmentosa.

‡ Owing to abnormal corneal curvature the images in the keratometer could not be made to meet, and consequently accurate estimation became impossible.

** The system of notation of axes employed above is that authorised by the Optical Standards Committee of the Optical Society.

NOTE.—The axes of the cylinders under corneal astigmatism coincide with those given under the heading Retinoscopy.

Over this area some impairment of retinal function may be elicited in response to colour tests. Of five cases examined for green in good diffused daylight, three presented a flattening of the upper part of the field extending to about 15° from the fixation point, and one a sector-shaped defect extending to 10° from the same point. The fifth case had apparently no colour field deficiency. A somewhat similar bleaching of the lower part of the fundus is often observed in cases where the rest of the fundus and disc remain otherwise normal; these cases are very frequently associated with astigmatism and probably represent a minor degree of the condition under discussion.

It is worthy of note that when the crescents are bilateral, the condition may be more marked on one side than the other, and the position of the crescent may differ considerably in the two eyes.

Summary.

Of the thirty cases examined, 15 occurred in males and 15 in females, so that the condition evidently occurs with equal frequency in the two sexes.

It occurred unilaterally in 16 cases, bilaterally in 14; in the former the left eye was more frequently affected in the proportion of 9 to 7.

Out of the total number of eyes examined, the condition was present in more or less degree in 44. The affected eyes were invariably astigmatic; 10 presented purely corneal, 6, purely lental, and 28, combined corneal and lental astigmatism.

The correspondence observed between the axis of the meridian of greater refraction and the direction of fundal stretching would seem to justify the conclusion that they are closely related as to cause and possibly throws light on the ætiology of simple corneal astigmatism, which, similarly, may owe its origin to some stretching of the tissues filling up the anterior part of the fœtal ocular cleft.

In conclusion, my thanks are due to both Mr. G. Coats and Mr. A. C. Hudson for valuable suggestions as to the scope and preparation of this paper.

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CLINICAL MEMORANDUM.

A CASE OF DOUBLE THIRD NERVE PALSY DUE TO ACUTE POLIO-ENCEPHALITIS.

BY

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F. L——, aged 7 years, always a healthy boy, had a bad attack of measles with broncho-pneumonia in November, 1910, and in March, 1911,

contracted scarlet fever, for which he was in hospital for six weeks. There is no history of diphtheria. Later on in the summer, when at the seaside, his eyes are said to have been somewhat inflamed.

In the middle of August, he went to a village in Hertfordshire, and was there taken ill with sickness, the temperature rising to 103° F.; there were constipation and delirium at night. The temperature fell after three days, and the patient was very weak and was suffering from drooping of the eyelids and complaining of seeing double.

On September 9th he was brought to the Hospital, when his condition was as follows.—Marked double ptosis, slight lid elevation by the action of the frontalis, loss of elevation and depression of the globes, lateral movements fair with occasional complaint of diplopia to the right; pupils equal and active directly and indirectly; no paralysis of accommodation. R.V.=6/12 partly, J. 1 at 12 inches; L.V. as R. Hand-grip good; knee-jerks present; no other paralysis observed.

At the present time (November, 1911) the patient's health has much improved, but there is scarcely any change in the ocular condition, except for a very slight upward movement of the globes; the diplopia can also be elicited sometimes.

The patient has been seen by Dr. Leonard G. Guthrie and others, who are agreed that the cause of the ocular palsy is acute polio-encephalitis.

REVIEW.

THE FIELD OF VISION.

(continued.)

BY

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PART II. *(continued).*

FIELD OF VISION IN DISEASED CONDITIONS.

Obstruction of the Retinal Vessels.

COMPLETE obstruction of the central retinal artery generally results in the entire loss of the visual field. If, however, a cilioretinal artery be present, central vision may be retained, as in the case reported by Hay.[1] The field in such a case would be a narrow oval strip extending from the point of fixation towards the blind spot. Apart from this partial retention of function through a subsidiary arterial supply, Hancock[2] found eccentric areas which were functionally active in cases of complete obstruction of the central retinal artery. In 88 per cent. of the cases, the preserved portion was on the temporal side. This retention of part of the field is ascribed to anastomoses of the retinal with the choroidal capillaries at the anterior part of the retina, which generally only extend far enough forward on the nasal side to benefit by the arrangement, or to the probability that this part of the retina derives its nourishment mainly from the choriocapillaris. In some cases the vascular anastomosis round the optic disc (circle of Haller and Zinn) enables a small

neighbouring area of the retina to retain its function, as proved by a case reported by de Schweinitz and Holloway,[3] in which a small circular field round the blind spot was preserved. Levy[4] and Meller[5] have reported cases in which the obstruction occurred in a cilioretinal artery, whilst the central artery remained patent. In these cases, there was an oval absolute central scotoma. In those cases where, for various reasons, vision is regained in obstruction of the central retinal artery, it is usual to find some restriction of the field and a central scotoma (Ridley[6], Caspar[7]).

Photo-traumatism of the Retina.

The visual disturbances following exposure of the eyes to the sun's rays (either directly or during an eclipse), to strong electric light, or to a reflection from snow fields, are often associated with positive central scotoma for white and colours, or for colours only. This scotoma may be absolute or relative, steady or flickering, and in the case of sun blindness, generally appears to the patient about the same size and shape as the sun's orb. Most cases recover, but the scotoma may be permanent.

The literature on eclipse blindness is fairly extensive. There is need for further observations as to the effect on the eyes of powerful electric light, such as arc lights, or light from an electric furnace. Valois[8] found concentric contraction of the visual field, with temporal pallor of the discs, as the result of exposure of the eyes to the light of an arc lamp, and Dor[9] reported a case in which a sector defect, involving about one-eighth of the field, appeared in one eye after a severe electric shock. In the latter case, however, there was partial atrophy of the optic nerve, and the lesion was presumably one involving the nerve directly, rather than a primary injury of the retina. Cosmettatos[10] has reported a case in which optic neuritis in one eye followed the observation of an eclipse. A year later, the optic nerve was found completely atrophic, and sight was almost abolished.

Beauvois[11] states that colour vision and visual fields are not affected in eclipse blindness; but Ferentinos[12] has noticed disturbances of colour vision, and Casali[13] also reports frequent contraction of the field for white and colours.

Toxic Amblyopia.

The character of the visual fields in toxic amblyopia is largely dependent on the nature of the lesion produced by the toxic agent. Where the lesion is a retrobulbar axial neuritis, as is generally the case in poisoning by tobacco, alcohol, iodoform, carbon bisulphide, etc., a central scotoma, with full fields, is the rule. On the other hand, contraction of the peripheral field, with or without central scotoma, is found when the lesion is one of primary or secondary optic atrophy, as in poisoning by lead, quinine, methyl alcohol, filix mas, atoxyl, etc.

Harman[14] finds that if the fields are taken in diminished light, concentric contraction will be found in most cases of tobacco amblyopia. Bär[15] also noticed that in tobacco-alcohol amblyopia with absolute scotoma, and even in the presence of a relative scotoma, if the pupil was contracted by eserin, there was a reduction in the light-sense. He also found that although the scotoma was generally typically horizontally oval in shape, it often formed two disconnected spots. Green perception was found to be the first to suffer and the last to recover.

Hollman[16] also found that the fields for white and colours were more or less contracted in cases of acute alcoholism—after a debauch—and a scotoma was present in 50 per cent. of the cases. Exceptions to the above-mentioned rules

are fairly numerous, *e.g.*, Snyder[17] has reported a case of iodoform poisoning, in which there was neuroretinitis, which resulted in optic atrophy. Mohr[18] has placed on record a somewhat similar case, in which the upper part of the fields was much contracted. Czrellitzer[19] had a case of poisoning by carbon bisulphide in which there was concentric contraction of the field. Carbon bisulphide appears to affect central colour perception for red more than any other colour (Golesceano[20]). v. Krüdener[21] recognises two forms of methyl-alcohol blindness, one a retrobulbar neuritis associated with central scotoma, and amenable to treatment; the other, a primary progressive atrophy of the optic nerve, with peripheral contraction of the field, which is incurable.

Central scotoma, with contraction of the peripheral field, has also been noted in poisoning by fumes of nitro-benzol (Sesnelinsky[22]), nitrous oxide, formic and osmic acid, but homonymous hemianopia, resulting from carbonic acid poisoning, is ascribed by Enslin[23] to cortical hæmorrhage. Probably, a like explanation would account for the homonymous left-sided quadrant anopsia following toxic doses of sodium salicylate, recorded by Claiborne.[24] The toxins of intestinal fermentation, and other endogenous toxins, and those of cachexia and burns, generally set up retrobulbar neuritis only; but Lindenmeyer[25] has placed on record a case of retrobulbar neuritis, associated with retinal hæmorrhages, the result of burns. Tea, coffee, antipyrin, copper, aniline—from hair-dye, etc. (Berger[26]), and thyroid gland intoxication, may result in retrobulbar neuritis; but in the case of thyroid gland, secondary degeneration of the optic nerves, with contracted fields, is liable to follow. Bulson[27] has recorded cases of coffee amblyopia with marked contraction of the visual fields, but without central scotoma; he believes the direct toxic agent to be a ptomain produced in the stomach by the injurious influence of the coffee. Of the toxic amblyopias associated with atrophy of the optic nerve, and contraction of the retinal vessels, those due to methyl alcohol, filix mas, quinine, and atoxyl, have attracted considerable attention in recent years.

Buller and Casey Wood[28] found contracted fields and absolute central scotoma in their cases of poisoning by methyl alcohol. Atoxyl, according to Birch-Hirschfeld,[29] gives rise to visual trouble before the stage of optic atrophy sets in, and during this period the only symptom is nasal or concentric contraction of the visual field for white and colours, while the central vision for colours remains intact. v. Krüdener,[30] who also comments on the marked early contraction of the fields in these cases, observed excessive contraction for colours and a paracentral scotoma for grey. Fehr[31] found concentric, and especially nasal, contraction of the field, with central scotoma in the early stages of atoxyl poisoning.

(*To be continued.*)

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2.—GUIDE TO THE MICROSCOPIC EXAMINATION OF THE EYE.

(*Continued.*)

BY

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3. HARDENING IN ERLITZKI'S FLUID.

Erlitzki's fluid acts in the same way as Müller's. It is composed of :—

Bichromate of potash	50
Sulphate of copper	10
Distilled water	1,000

This reagent unfortunately tends to produce shrinkage and to cause deposits and is, therefore, not very suitable for minute examinations. It possesses the advantage, however, of fixing much more quickly than Müller's fluid. About 10 days suffice for a complete eyeball at ordinary temperatures, or 4 days in the incubator (40° C). Then follow thorough washing in water and further hardening in alcohol.

The author has often employed this fluid, and the results have usually been satisfactory.

4. HARDENING IN CORROSIVE SUBLIMATE.

Corrosive sublimate is in many cases an admirable hardening medium. It fixes nuclei and karyokinetic figures excellently. There is no better method for the demonstration of these (See "Heidenhain's Method"). The nuclei stain particularly well, while the cell bodies are usually feebly brought out.

Corrosive sublimate possesses slight penetrating power. It is employed as a concentrated aqueous solution of about 1 in 20. Boiling water dissolves 1 part of sublimate in 7.5. Some authors employ a 0.5 per cent. salt solution instead of water. Others add acetic acid to the mixture.

N.B.—Acetic acid, on account of its penetrating power, is recommended as an addition to almost all preserving media, especially to the chromic salts.

The unopened eyeball remains in the fluid for 12-24 hours, or, if placed in the incubator, for 2-3 hours. Longer immersion renders the tissues too hard.

It is then washed in running water for 24 hours, in order to remove the sublimate.

The hardening is completed in alcohol gradually increased in strength.

Thorough removal of the sublimate is most important, because mercurial precipitates appear black, and may easily be confused with the pigmented structures of the eye. It is well, therefore, to divide the bulb while it lies in alcohol, and to add to the alcohol a few drops of tincture of iodine, or of a solution of iodine and iodide of potassium, until a wine-red colour results. Should there still be any mercury in the preparation it is extracted, and forms iodide of mercury, so that after some hours the solution becomes colourless. The alcohol is renewed, more tincture of iodine added, and so on until a wine-red colour remains permanently. Pure alcohol is then employed, and this is gradually increased in strength until the stage of absolute alcohol is reached. Now follow imbedding, etc.

5. Hardening in Zenker's Fluid.

Corrosive sublimate	5
Bichromate of potash	2.5
Sulphate of soda	10
Distilled water	100

Before the solution is used, five parts of acetic acid are added. The eyeball should remain only six hours in the fixing medium. It should then be thoroughly washed, and treated with alcohol and tincture of iodine to ensure the removal of the mercury.

Zenker's fluid is the best hardening medium, because in it the choroid retains its normal thickness. Formalin causes the vitreous to swell up and to compress the choroid.

6. Hardening in Picric Acid.

For small and delicate specimens, and, in particular, for embryonic tissues, picric acid is employed in the form of a concentrated aqueous solution. In this the pieces remain for 24-48 hours, and are then transferred, without being washed in water, to 70 or 80 per cent. alcohol. The next stage is the extraction with alcohol of the picric acid, since it interferes with the staining. To attain this object, the alcohol is renewed until it no longer shows a yellow tinge. This may take a considerable time.

7. Hardening in Picric Acid Sublimate.

Preferable to pure picric acid for fixing delicate tissues is a mixture of picric acid and corrosive sublimate. Equal parts of saturated aqueous solutions are taken. Although more suitable for small pieces, entire eyeballs can be hardened in it.

Eyeballs are placed in the mixture for 24-30 hours.

Small pieces are placed in the mixture for 10-20 hours.

Thorough washing in running water for 1 day.

Alcohol, 70 per cent., etc.

The mercury must be removed by means of iodine in the manner explained in section 4. This is accomplished in a comparatively short time. To get rid of the picric acid, which is a much more tedious process, it is necessary to change the alcohol several times.

8. Hardening in Formalin.

Formalin (Schering) or *Formol* (Höchster Farbwerke) is an aqueous solution containing about 40 per cent. of the gas formaldehyde (HCHO). Blum was the first to use it for microscopic work. It is a clear liquid with a pungent odour. Although allied to alcohol, formalin is remarkable not so much for its power of extracting water as for the rapidity with which it fixes the tissues without destroying the form of the globe. In this respect it is one of the most excellent hardening media at our disposal. The eyeballs should not, however, lie too long in formalin if it is intended to prepare microscopic sections, for in no other fluid do sclera and lens become so hard. It must, therefore, be avoided if the lens is to be examined. On the other hand, since formalin possesses the property of maintaining the shape of the bulb, it is an excellent fluid to use when specimens are being mounted for the museum. Further, formalin preserves the transparency of the cornea; this is of importance when the preparation is intended to be used for macroscopic demonstrations. The lens, however, becomes very opaque in formalin. Its action on cornea and lens is the reverse of that of other hardening media. When treated with formalin, the tissues retain their colour, and take up most stains well. Weigert's stain for the medullary sheaths can be applied to nerves hardened in formalin, if the preparations are immersed in a chromium or iron solution for a few weeks before being placed in alcohol. Further, formalin has been recommended in recent times as a substitute for osmic acid in Golgi's method.

A 10 per cent. aqueous solution of formalin is used, *i.e.*, a mixture consisting of one part of the commercial liquid and nine of water. Formalin fixes still better when diluted with salt solution instead of water. The formula is:—

Formalin	100
Chloride of sodium	6
Distilled water	1,000

In this the eyeball remains 12, or, at most, 24 hours. Washing in water is unnecessary, the subsequent hardening in alcohol following immediately. The strength of the alcohol must be increased very gradually, as otherwise shrinking is apt to take place.

Another advantage attached to the use of formalin is its rapid action.

Its chief disadvantage is that the choroid is compressed owing to the swelling of the vitreous which occurs in formalin solutions.

Formalin, again, should not be employed if it is desired to study the ocular pigment; for it extracts from the blood, and deposits in and between the cells, a granular pigment which resembles melanin. This cannot be removed, and may lead to grave errors.

Orth's Formalin-Müller Mixture.—Orth has suggested a mixture of formalin and Müller's fluid, which can be highly recommended. The following is the procedure:—

The eyeball is laid for 2 or 3 days in a mixture of Müller's fluid (4 parts) and pure formalin (1 part), plenty of the reagent being taken. Fixation is carried out in the dark, since formalin undergoes chemical changes when exposed to light and air.

Thorough washing, 12-14 hours, in running water.

Completion of the hardening process in alcohol gradually increased in strength.

If it is desired to stain the medullary nerve sheaths, the tissue is not washed, but is transferred to pure Müller's fluid for a few days, and is then treated with alcohol of gradually increasing concentration.

9. Hardening in Osmic Acid.

Osmic acid was first employed by Max Schultze in the form of a 1-2 per cent. solution; by means of it he made his classical investigations into the retina. At present osmic acid is either used alone, or as an ingredient of many mixtures required for special methods, *e.g.*, those of Marchi, Golgi, etc., which will be described later. Osmic acid can also be used in the form of vapour for fixing purposes.

The following rules should be observed when osmic acid is employed:—

Osmic acid is decomposed by light; it should, therefore, be preserved in dark glass bottles, and, since it is very volatile, these must be securely stoppered. In any case, however, it does not keep well, and solutions should be freshly made. The vessels used should be absolutely clean. The solutions must not be brought into contact with iron; platinum needles are employed. Long exposure in osmic acid renders the tissues brittle. It is the most rapid fixing medium, but, since it has little penetrating power, the pieces to be treated are chosen as small as possible. Dimmer has succeeded in hardening complete bulbs in Flemming's solution, and has secured specimens exhibiting the retina fixed in its position and free from folds. To obtain this result, large incisions, extending into the vitreous, are made along the equator of the eyeball.

Osmic acid exhibits the body of the cell well, but the nuclear stain is sometimes defective. The karyomitotic figures, which stain more intensely than the nuclei, are very prominent.

Finally, osmic acid renders fat globules very dark, a property which is of value in the study of albuminuric retinitis, etc.

It should be noted that tissues hardened in osmic or other acids do not stain well with hæmatoxylin.

A suitable stain is a 1 per cent. watery solution of *safranin* ($\frac{1}{2}$-24 hours).

Methods of using Osmic Acid.

(*a*) *Pur Osmic Acid.*—The solution does not keep well, and so should be prepared freshly by the worker himself. The acid occurs in commerce in the form of yellow crystals sold in sealed glass tubes, each containing $\frac{1}{2}$ or 1 gramme. One of these tubes is placed in a clean bottle provided with a glass stopper. The tube is then broken, and the required quantity of distilled water is poured over the crystals. Care should be taken to avoid the vapour, which is very poisonous.

Pure osmic acid is usually employed for fixing the retinal elements, especially the rods and cones.

Fixation in $\frac{1}{2}$-2 per cent. solution. Small globes are treated as a whole; larger ones are bisected through the equator. The process lasts 6-24 hours. Washing in distilled water, which should be frequently changed, for several days.

Teasing.

Staining is usually unnecessary.

Mounting in glycerine.

(See "Examination of Retina.")

(*b*) *Mixtures containing Osmic Acid.*—Osmid acid is employed most frequently as a fixing medium in the form of *Flemming's Solution.* This consists of:—

Aqueous solution of osmic acid, 2 per cent. ...	4
„ „ chromic acid, 1 per cent. ...	15
Glacial acetic acid	1

The tissues remain in this for 1-3 days, not longer, or they become brittle.
Washing for 3-6 hours in distilled water.
Further hardening in alcohol, 50, 60, 80, 96 per cent., in each 24 hours.
Absolute alcohol, 2 days.
Celloidin.
Staining with 1 per cent. solution of safranin.

For Hermann's solution, a mixture of osmic acid and chloride of platinum, and for the use of osmic acid in the Methods of Cajal, Marchi, etc., see later.

(c) *Osmic Acid in Vapour Form.*—The zoologist frequently employs the vapour of osmic acid to fix delicate tissues rapidly and safely. Ranvier recommends it for fixing the retina.

10. Hardening in Nitric Acid.

Benda proceeds as follows:—

1. Nitric acid, 10 per cent. solution, 24 hours.
2. Without being washed, the tissue is placed in
   Müller's fluid, 1 part
   Distilled water, 2 parts } 48 hours.
3. Müller's fluid
   Distilled water } equal parts, 48 hours.
4. Müller's fluid, 2 parts
   Distilled water, 1 part } 48 hours.
5. Washing in water, 24 hours.
6. Further hardening in alcohol.

The ordinary nuclear stains are not suited for tissues so treated.

The stains of Heidenhain or Benda should be used. By these the nuclei and karyokinetic figures are particularly well displayed. Benda's method of hardening renders the tissues very brittle, and is not suitable for large specimens. Benda stamps out small pieces of the ocular tunics with an iron punch.

Nitric acid is, after osmic acid, the best medium for the demonstration and isolation of the retinal elements. It possesses this advantage over osmic acid, that it preserves the natural colour of the retinal pigments, the yellow pigment of the macula lutea and the coloured globules found in the cones of many animals, etc.

Altmann recommends weak solutions (3-3½ per cent.). In this the formed elements are fixed, and demarcated from the soluble albuminates which surround them.

The fixing process lasts 6-10 hours.
Rapid, but thorough, rinsing.
Alcohol, 80 per cent., for a short time.
Sections are made, or the tissue is teased in glycerine (See "Retina").

11. Hardening in Chloride of Platinum.

1. Aqueous solution of platinum chloride, 1 per cent. (Merkel) 50
   Aqueous solution of chromic acid, 1 per cent. 50
   Distilled water 300
   The specimen is exposed to this mixture for 24, or, at most, 48 hours.
2. Washing in running water, 24 hours.
3. Completion of the hardening process in alcohol gradually increased in concentration.

This solution fixes and hardens quickly, and preserves the topographical relations of the parts. Hæmatoxylin is the best stain.

12. Hardening in Hermann's Solution.

Hermann's solution is a mixture of platinum chloride and osmic acid. It consists of—

Solution of platinum chloride, 1 per cent. ...	15
Solution of osmic acid, 2 per cent.	4
Glacial acetic acid	1

Small objects are fixed for 1-4 days, and then thoroughly washed in running water.

Further hardening in alcohol, etc.

Hermann's solution preserves the nuclear and protoplasmic structures excellently.

Staining with safranin or gentian-violet.

13. Hardening in Merkel's Fluid.

The fluid consists of:—

Chloride of platinum	1
Distilled water	400
Chromic acid	1
Distilled water	400

These solutions are kept separate, and equal parts are mixed before use. The fluid is not concentrated, and so, while possessing considerable penetrating power, it is slow in its fixing and hardening action. Since it produces great swelling of the vitreous, it is, as has been said, suitable for hardening collapsed eyeballs or thin-walled staphylomata. It is not adapted for the lens.

The tissues remain in Merkel's fluid for 3-4 days, and undergo further hardening in another fluid (Müller's fluid, formalin, alcohol).

Hæmatoxylin stains the sections very slowly.

Washing.

The eyeballs or pieces of tissue must be thoroughly washed after most of the fixing processes, and this is best accomplished in running water. Only in the case of a few reagents, *e.g.*, formalin and, under certain circumstances, picric acid, is this unnecessary.

The eyeball is placed in a tall vessel under a water tap. A piece of rubber tubing is led from the tap to the bottom of the vessel. The stream must not fall simply on the surface of the water, but must be so directed that the whole of the water is constantly renewed. Nor must the stream be too violent, else the preparation is washed away. If the specimen is light and floats, it is well to cover the mouth of the vessel with gauze.

When several specimens have to be washed simultaneously, the vessels may be placed close together, and the water led from one to another by means of small glass siphon-tubes. There are several forms of washing apparatus on the market : some are simple, others complicated.

Completion of the Hardening Process in Alcohol.

After the eyeballs or pieces of tissue have been fixed and washed, they should always undergo further hardening in alcohol. To prevent shrinking, they are not placed in pure alcohol at once, but are transferred to weak

alcohol, the strength of which is gradually increased. According to the result desired, this process is conducted more or less slowly. In general, the bulbs, are placed in :—

1. Alcohol, 70 per cent., 24 hours.
2. ,, 80 ,, 24 ,,
3. ,, 90 ,, 24 ,,
4. ,, 96 ,, 24 ,,
5. ,, absolute, 48 ,,

The last stage is carried out in the exsiccator. See "Celloidin Process."

The bulb may remain in any of these alcohols as long as is desired, the alcohol acting as a preserving medium.

Division of the Hardened Eyeball.

It has been said that the eyeball is placed unopened in the fixing medium, unless this is osmic acid. It must, however, be cut into pieces before being imbedded. This operation is best performed when the eye has attained its maximum degree of firmness, *viz.*, after it has lain in absolute alcohol for one day. The lines of section depend on the position which the segments are intended to occupy in the celloidin block. At the outset it may be remarked that no method is less practical than that of bisecting the bulb along the horizontal meridian. Every one possessed of even slight experience, knows that, especially in the case of large specimens, the first few and the last few sections are lost. Consequently, if the bulb be bisected horizontally, in whatever way it is mounted, whether with the cut surface above or below, many of the most valuable sections, those which pass through the papilla, macula, and pupillary area, are inevitably lost. Moreover, if this method be adopted, since the vitreous sinks towards the sclera, sections affording a complete view of the centre of the eyeball cannot be obtained. It is best, therefore, to cut the bulb into three, or in some cases into five, discs : unless in special circumstances the lines of the section should be horizontal.

Orientation of the Bulb.—The horizontal meridian is easily recognized from the form of the cornea, which is over-lapped by the limbus conjunctivæ to a greater extent above and below than laterally. This diameter of the cornea is, therefore, somewhat longer than the vertical, the circumference forming an ellipse with its major axis placed horizontally.

A further indication of the position of the eye is gained by noting that the entrance of the optic nerve lies almost in the horizontal meridian and slightly internal to the posterior pole.

There only remains the determination of the superior and inferior aspects. If the cornea has not been marked, a piece of thread may be tied to the tendon of the Rectus Superior muscle after enucleation ; or, simpler still, the side to which the eye belongs is noted. The eyeball must then be held so that the optic nerve lies internal to the posterior pole, in order to indicate which is the superior aspect.

When the eyeball is cut into horizontal discs, the papilla, macula, and pupil are found in the middle segment in the same plane. This plane should be carefully guarded in opening the eye, and gradually cut down upon with the microtome.

The hard lens occasions some difficulty during the division, since the almost empty cavity of the vitreous affords it no support, and the easily ruptured zonula alone holds it in position. Hence, if the section is made from the corneal aspect, it usually happens that the lens, instead of being cut, recedes before the knife and is dislocated into the cavity of the vitreous. It is there-

fore important, in performing the section, to place the cornea firmly on the table, and to cut from above. In this way the lens is supported by the iris, and it in its turn by the cornea. It is still better to make the upper and lower domes to be removed from the eyeball so small that the knife does not require to traverse the lens.

The division is carried out with a thin sharp knife applied in steady and continuous sweeps to the eye. To avoid cutting in to the table, the section of the cornea should be completed with scissors, or the eyeball may be rested on a piece of soap or on a cork.

The middle segment (2) is examined first. It is mounted horizontally. The upper and lower segments may be arranged similarly, but in this case the

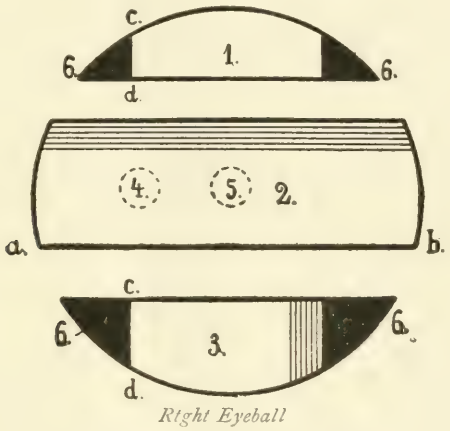

FIG. 1.—Method of dividing the Eyeball.

1, Upper; 2, Middle; 3, Lower segment; 4, Papilla; 5, Macula; 6, Discarded corners. *ab*, Surface by which the middle segment is fixed to the block. *cd*, Surfaces by which the upper and lower segments are fixed. The thin lines indicate the direction of the microtome cuts.

microscopic sections become more and tangential as they approach the poles. This is sometimes confusing to the beginner, especially if little folds are present. It is better, therefore, to remove the two corners (6) of these segments, and to mount the central portions vertically. Sections are thus obtained perpendicular to the tunics of the eye.

In special cases, *e.g.*, where there is a fungiform tumour of the choroid, it may be necessary to divide the bulb in a different manner. If it is cut in such a way that incisions are made across the head of the tumour, the origin of the growth is not demonstrated, and isolated portions are shown lying in the cavity of the vitreous.

Thus, the section should not be made, as in Fig. 2, vertically along *ab*, nor yet in the direction *cd*, for in both of these cases it would cross the summit of the tumour. It should be made in the plane of the diagram, that is, perpendicularly to the base of the tumour. If the exact site of the tumour has not been noted by means of the ophthalmoscope, it is still possible to discover this in the hardened eye, palpation of the walls of the globe revealing increased resistance over the seat of the tumour.

In other cases, again, the method must be modified to suit the circumstances.

The eyeball, either fresh or hardened, is often frozen before being divided. Such a procedure is advocated by Priestley Smith (*Ophthalmic Review*, March, 1883). The eye, previously hardened in Müller's fluid, is placed in a gutta-

percha bag, the surface of which has been smeared with oil to prevent adhesion, and frozen solid by immersion in a vessel containing a mixture of two-thirds pounded ice and one-third salt. The vessel should have an opening in its bottom to allow the water to drain away ; a small flower-pot is suitable. The eye remains in the freezing mixture for at least half an hour. It is then cut with a sharp table-knife in the desired direction. It is more difficult to

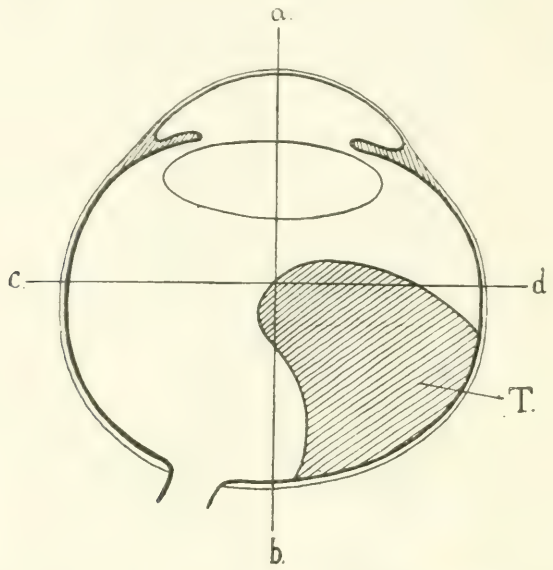

FIG. 2. -Method of dividing the Eyeball to exhibit origin of tumour.

perform the section with a thick-backed blade, like that of a razor. If necessary, the lines of the incisions can be marked out in ink.

Leber has devised a very useful instrument in the shape of a guillotine, with which the bulb can be divided in any direction, *e.g.*, through the centre of the cornea and the middle of the optic nerve. The only objection to the apparatus is its high price (*Report of the 22nd Ophthalmological Congress*, 1892, p. 211).

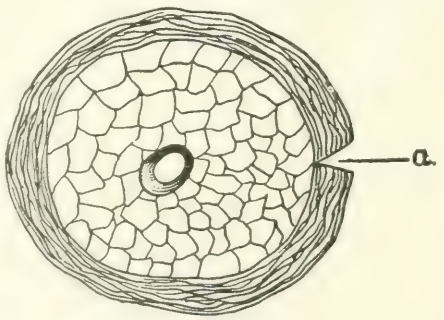

FIG. 3.—Method of marking the Outer Aspect of the Optic Nerve.

Method of Dividing the Optic Nerve.—In conclusion, a few words must be said regarding the method of section to be followed in examination of the optic nerve. The intraocular end of the nerve is usually cut longitudinally. Farther back in the nerve cross-sections are made. If the case is one of

partial atrophy, for instance, atrophy of the papillo-macular bundle, it is important to trace the course of the fibres. These, as is well known, change their position as they pass along the nerve. A guide is then necessary to show how the individual sections were situated in the nerve. If a considerable length of the nerve is to be examined, it should, before being placed in the fixing fluid, or, at all events, before being severed from the globe be incised with a sharp knife along its outer aspect. The outer margin of every section can now be recognised by the gap in its dural sheath (Fig. 3, *a*).

Further, it is necessary to divide the nerve into pieces 5-7 mm. long, and this should be done before it is placed in Müller's fluid, because small pieces harden better and are more suitable for mounting. To prevent confusion, the author does not sever the nerve completely. A small bridge of dura is left undivided so that the segments remain connected. The whole is then hardened and placed in celloidin, and the connecting links are not divided till the pieces are ready to be placed in the block. In this they are inserted in order, the most anterior being taken first. The anterior end of each segment should be placed uppermost. Thus, the fibres can be traced along the whole course of the nerve without difficulty.

When it is desired to examine the contents of the intervaginal lymph space, *e.g.*, in cases of cerebral tumour and choked-disc, the nerve must be ligatured before being divided.

(To be continued.)

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—OPHTHALMOLOGY AND GENERAL MEDICINE.

(1) **Laferèrre.—Ocular troubles due to ptomaines.** (**Troubles oculaires dus aux ptomaïnes.**) *L'Ophtalmologie Prov.*, T. IV, p. 91, septembre, 1907.

(2) **Okinczyc and Kuss.—Intracranial metastasis with compression of the oculomotor nerve in a case of gastric cancer.** (**Métastase intracranienne d'un cancer gastrique et compression du nerf moteur oculaire commun.**) *Ann. d'Oculistique*, T. CXXXVIII, p. 174, septembre, 1907.

(3) **Bouchart.—A case of complicated ophthalmic migraine.** (**Un cas de migraine ophtalmique associée.**) *L'Ophtalmologie Provinciale*, T. V, p. 188, décembre, 1908.

(4) **Yamaguchi, H. — Central scotoma in beri-beri (Kakke).** [**Zentralskotom in Beri-beri (Kakke).**] *Klinische Monatsblätter f. Augenheilkunde*, Mai, 1909.

(5) **Gowers, Sir William R.—Special sense discharges from organic disease.** (The Hughlings-Jackson Lecture delivered before the Neurological Section of the Royal Society of Medicine, on November 25th, 1909.) *Lancet*, 18th December, 1909.

(1) **Laferèrre's** patient, a man aged forty-five years, had an attack of diarrhœa, vomiting, and headache, as the result of eating fish. Ten days later, his accommodation became weakened, so that his reading lenses had to be strengthened 1·5 D. His pupils were semi-dilated, and his optic nerves hyperæmic. His hearing was also affected, so that he confused words with each other. Six weeks later, all the symptoms had disappeared.

R. J. COULTER.

(2) **Okinczyc** and **Kuss** record a case of cancer of the pylorus, with numerous metastases in the liver, in which a secondary carcinomatous nodule developed rapidly on the postero-external surface of the sella turcica, causing paralysis of the third nerve. They consider that cerebral or intracranial metastases may occur in cases of gastric cancer, and are relatively frequent in the neighbourhood of the cavernous sinus, causing at times paralysis of the nerves, especially the oculo-motor. They insist on the necessity in all cases of cerebral or intracranial cancer of making a search for a primary growth in the thoracic and abdominal viscera. R. J. COULTER.

(3) **Bouchart** records a severe case of ophthalmic migraine with associated paraphasia, agraphia, paresis of the tongue and lips, and buzzing noises in the ears. The vision of the right eye was 1/4 and that of the left 8/10, but the fields and muscle balance were perfect, and there was no abnormality to account for the defective sight. At first the attacks occurred at intervals of two years, but they gradually got more frequent, until, finally, three or four often occurred in a few days. Under treatment with bromides and a chlorine-free diet, frequent laxatives, and mild hydrotherapy, there was so much improvement that when last heard of, the patient had been quite well for ten months, and had given up Bouchart's treatment for some time. He, himself, however, attributed his cure to abstention from snuffing, and frequent blistering on the arm with spurge-flax (*Sainbois*). SYDNEY STEPHENSON.

(4) **Yamaguchi's** patient suffered from beri-beri of a mild character. His vision was 6/18 and 6/24 respectively, and there was a bilateral central scotoma. The patient recovered completely from beri-beri ; at the same time the scotoma disappeared and vision became normal. Central scotoma has been repeatedly observed in this disease, and its occurrence may be regarded as a point in favour of the toxic origin of beri-beri. C. MARKUS.

(5) **Sir William Gower's** lecture possesses that fascinating interest which is characteristic of his writings. In the present communication he is dealing with olfactory, auditory, and visual symptoms of epilepsy, more especially when associated with organic disease. The minutely detailed clinical histories, the close accounts of *post-mortem* examinations, and the deductions therefrom as applied to the clinical symptoms, while they are intensely interesting to read, are practically impossible to abstract. ERNEST THOMSON.

II.—MACULO-CEREBRAL DEGENERATION.

Oatman, Edward L.—**Maculo-cerebral degeneration (familial).** *American Journal of the Medical Sciences*, August, 1911.

An important article by **Oatman**, of New York City, deals with cases where a degenerative process in the retinal macula is often associated with a similar process in the brain. Of this rare condition the author distinguishes

two types: 1st, the *maculo-cerebral*, in which both retina and brain are involved; and, 2nd, the *macular*, in which the changes are confined to the retina.

Oatman details the cases of maculo-cerebral degeneration described by R. D. Batten (1902), Mayou (1904), Stephenson (1904), Hirschberg (1904), and Nettleship (1908). As to the macular type, he treats in a similar way the cases described by R. D. Batten (1897), and Stargardt (1909), and he further mentions a case by Leber, unpublished, but quoted by Stargardt.

The author gives full details of two cases presented by him in the year 1907 to the Ophthalmological Section of the New York Academy of Medicine, and published in the *Archives of Ophthalmology*, Vol. XXXVI, p. 554.

The maculo-cerebral type of degeneration is characterised by Oatman somewhat as follows.—Simultaneous failure of sight and of intellect ensues at about six or seven years of age, in a child who up to then has appeared to be normal in both respects. The mental condition varies from mere irritability to actual imbecility. In some of the reported cases there have been epileptiform convulsions. Both eyes are affected. The earliest ophthalmoscopic change consists in slight pigment disturbance in the retinal epithelium. In more advanced cases, the ophthalmoscopic picture includes atrophy and pigmentation of the retina in the macular region, bleaching of the optic disc, and narrowing of the retinal vessels. Small light-coloured spots, which do not present the appearance of exudates, may be present in the surrounding retina. The functional eye disturbance consists of central scotoma for green and red, failure of central vision, and (sometimes) day-blindness. Failure of the visual acuity may precede even the earlier ophthalmoscopic changes (Stargardt). As the disease advances, the colour scotoma increases in size, and in the late stage becomes absolute. Central perception of light is lost, and the patient develops eccentric fixation, attended by nystagmus and lateral deviation of the eyes and head. Although no patient has become completely blind, yet some have become, as Oatman puts it, "abject imbeciles."

On the other hand, in the second type of the disease the degeneration occurs in the macular region, but spares the intellect. The earliest case began at the age of ten years. But, broadly speaking, it may be said to develop later than the maculo-cerebral type, usually during puberty, when the child is from fourteen to sixteen years of age. The pupils are more active than in the other type, and the optic disc does not blanch so early as when the brain is involved. Epilepsy does not occur.

In both types of the disease the patients are otherwise in good health, and are free from malformations.

In every instance the affection was confined to one or more members of a childship, and was not found amongst ancestors or descendants. Finally, no case has so far been reported among Hebrews.

Pathological Anatomy.

In the absence of a microscopic examination, the histological changes can only be surmised from a consideration of the ophthalmoscopic picture. The primary lesion is possibly in the choriocapillaris, leading to an atrophic degeneration of the retina, commencing in the outer layers. The absence of all ophthalmoscopic evidence of inflammatory change suggests that the atrophy of the retina results from nutritive disturbance. Rarefaction of the pigment leads to its distribution in the retina; but it does not proliferate, neither is it fixed, inasmuch as it eventually disappears. Ultimately, the

retina is converted into a thin cicatricial membrane, and constitutes the delicate film which covers the macular region in advanced cases. The light-coloured spots described ophthalmoscopically in many cases, which may be due to thickening of the lamina vitrea or of the retinal neuroglia, should be regarded as degenerative rather than as exudative. The optic atrophy is probably secondary to retinal degeneration, although this is not certain as regards the cerebral cases.

Ætiology.

Racial predisposition may be excluded, seeing that no case has been met with in a Hebrew, and a similar remark applies to hereditary tendency to diseases of the eye. Congenital syphilis was surmised, but not proved, in one childship. Blood-relationship existed in four of the childships affected by the maculo-cerebral and in one of the four childships affected by the macular type of degeneration. Oatman therefore thinks that consanguinity may be "measurably causative." Nettleship, as a cause for the retinal degeneration, has suggested a nutritive disturbance due to the exanthemata or to other exhausting conditions. The author appears to lean towards the autotoxic theory, as formulated by Stargardt and Max Schlupp. That the maculo-cerebral type of disease appears with the second dentition, while the macular type is delayed until puberty, is probably no mere coincidence. More likely the developmental forces active during dentition and sexual evolution are here perverted to stimulate a latent degenerative tendency.

Diagnosis.

There are several affections that bear some resemblance to maculo-cerebral degeneration. Among these may be mentioned hereditary macular anomaly (F. Best), retinitis pigmentosa, amaurotic idiocy, central chorio-retinitis, and certain as yet undefined cases.

Maculo-cerebral degeneration differs from the condition first-named in its family history, late onset, progressive course, cerebral complications, central colour scotoma, optic atrophy, and, finally, by the fact that it invariably affects both eyes. Maculo-cerebral degeneration differs from *retinitis pigmentosa* in the following respects.—The most constant symptom of retinitis pigmentosa, night-blindness, is conspicuous by its absence in maculo-cerebral degeneration. The family trees in the latter disease are remarkably free from a tendency to eye diseases, whereas family persistence and hereditary tendency are pronounced features in pigmentary retinitis. In true retinitis pigmentosa ophthalmoscopic changes invade the macula last of all, but in the other disease the macula is the part to be first invaded. The colour sense fails only with light perception in retinitis pigmentosa, but in one of the earliest manifestations of maculo-cerebral degeneration is a central scotoma for green and red. Ten per cent. to thirteen per cent. of patients with retinitis pigmentosa are congenital idiots; the subjects of maculo-cerebral degeneration are born with normal intellect, which may afterwards be destroyed by the disease. Malformations, common in retinitis pigmentosa, are lacking in maculo-cerebral degeneration. Lastly, another point of distinction is to be found in the fact that while retinitis pigmentosa may be transmitted for generations, maculo-cerebral degeneration is a familial disease.*

Nettleship, as well known, suggested that there was a relationship between

* Oatman defines a familial disease as "one that occurs among members of a childship, but has shown little or no tendency to affect ancestors or descendants."

amaurotic family idiocy and maculo-cerebral degeneration. Apparently, however, the two diseases are entirely different. Aside from obvious clinical differences between the maladies, macular degeneration begins in the outer layers of the retina, and remains limited to the central region of the fundus, whereas amaurotic idiocy, on the contrary, begins in the inner layer, and extends over the entire retina.

The history and course of maculo-cerebral degeneration finds no counterpart in *exudative choroiditis*, such as that due to syphilis or to tubercle.

Oatman concludes a notable contribution with these words: "Reports of ten childships exhibiting maculo-cerebral degeneration have been abstracted and presented. Considering that many of the authors wrote without knowledge of similar cases, the uniformity of their descriptions is remarkable, and justifies an attempt to segregate the disease from the multitude of unclassified cases in ophthalmic literature. That the two types described are modifications of one and the same disease is assumed upon clinical grounds. Possibly other cases separately described or altogether ignored should also have been included. Maculo-cerebral degeneration, undoubtedly, is very rare."

SYDNEY STEPHENSON.

III.—DEFORMITIES OF THE SKULL AND VISUAL DEFECTS.

(1) **Uhthoff, W.—On the pathogenesis of visual defects from deformities of the skull. (Zur Pathogenese der Sehstörungen bei Schädelde formitat.)** *Bericht. der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(2) **von Behr.—On the development of changes in the optic nerve in tower skull. (Zur Entstehung der Optikusveränderungen bei Turmschädel.)** *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1910.

(3) **Harman, N. Bishop.—Exophthalmos and facial deformity (as in oxycephaly) without deformity of the skull-cap.** *Transactions Ophthalmological Society U. K.*, Fasc. 2, 1910.

(4) **Hutchison, R.—Three cases of oxycephaly.** *Proceedings Royal Society of Medicine*, May, 1910.

(1) This paper by **Uhthoff**, of Breslau, is mainly concerned with the digital impressions and with deformation of the anterior portion of the base of the skull. In such cases the orbits are shortened and exophthalmos is present. The great wings of the sphenoid assume a more frontal position. These signs show that in early life there was great increase of pressure, thus accounting for the optic atrophy and choked disc which are frequently found. The importance of Röntgen ray examination is mentioned. Uhthoff discusses the great contraction of the optic canal, which he considers not to be the rule. He does not believe that meningitis occurs. The question of operative treatment is discussed. T. HARRISON BUTLER.

(2) **von Behr**, of Kiel, reported a case of a man, aged 60 years, with tower skull, whom he had examined both clinically and anatomically. The symptoms were amblyopia and contraction of the fields of vision. It was found that the optic nerve had been constricted by the carotid artery which entered the canal by an abnormal opening. von Behr has examined by lumbar puncture the cerebro-spinal pressure of cases of oxycephaly. In every instance there was increased pressure. T. HARRISON BUTLER.

(3) **Harman's** patient was a Jewess, aged ten years, whose parents and six siblings were normal. The child had the physiognomy typical of oxycephaly as regards eyes and face, but presented no head deformity whatever. The author concludes that "the occurrence of all the ocular and facial characteristics associated with oxycephaly, and yet without any sign of deformity of the skull-cap, tends to show that the designation of these cases by the terms 'oxycephaly' or 'tower-skull' is incorrect . . . . . ; 'tower-skull' may or may not be present, and we have no means of knowing what factor goes to determine the trend of symptoms towards a facial or a cranial deformity."

ERNEST THOMSON.

IV.—DIABETIC ALTERATIONS IN REFRACTION.

(1) Knapp, P.—Transitory hypermetropia in diabetes. (Transitorische Hypermetropie bei Diabetes.) *Zeitschrift für Augenheilkunde*, Mai, 1909.

(2) Lundsgaard, K. K. K.—Transitory hypermetropia in diabetes mellitus. (Transitorische Hypermetropie beim Diabetes mellitus.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1910.

(3) Wölfflin, E.—On temporary changes in refraction in diabetes mellitus. (Ueber temporäre Refraktionsabnahme bei Diabetes mellitus.) *Klin. Monatsbl. f. Augenheilkunde*, Oktober, 1911.

(1) **Knapp** (Basel).—It is a fact known to all ophthalmic surgeons that myopia frequently appears in a patient with incipient cataract. The reverse change, a transitory hypermetropia, or an increase of previous hypermetropia, is uncommon, but several cases observed by trustwothy authorities have been published. A paper by Machek has so recently been abstracted in THE OPHTHALMOSCOPE that it is unnecessary to review Knapp's paper, which covers much the same ground, in any detail. The author gives an account of two cases which occurred in his own practice. T. HARRISON BUTLER.

(2) **Lundsgaard** reports two instances of hypermetropia of sudden onset and a few weeks' duration in diabetics. Both patients were women, aged fifty years, with 6 per cent. of sugar in the urine. The first patient was naturally emmetropic, the transitory hypermetropia amounted to 3 D. and 3·5 D. respectively. In the second case the examination was more complete, atropine, tonometry, and ophthalmometry having been employed, in order to account for a decrease of 2 D. in refractive power. But no cause was discovered by these means, nor did the varying amount of sugar in the urine appear to be of influence. The crystalline lenses, however, showed very fine opacities, and Lundsgaard is inclined to bring those changes in connection with the observed hypermetropia. C. MARKUS.

(3) In the case reported by **Wölfflin**, of Basle, the refraction changed, in the course of two or three days, from emmetropia to hypermetropia of two dioptres. There was no change in the curvature of the cornea, and no change in the tension. Under treatment, the diabetes was cured, and the eye became once more emmetropic. The hypermetropia disappeared more slowly than it came, and the accommodative defect, which accompanied the hypermetropia, lasted a week or two longer. While the abnormal condition was present the image formed by the anterior surface of the lens nucleus was less distinct than it was after recovery. An attempt was made to reproduce the conditions by administering large amounts of carbohydrates, but without success.

In discussing the cause of the change of refraction, the author shows that

neither alteration in the index of refraction of the intraocular fluids nor changes in the curvature of the lens surfaces can be held responsible. He arrives at the conclusion that the presence of sugar in the aqueous causes an increase in the refractive index of the cortex, without causing any opacity. This change of index diminishes the difference between the cortex and the nucleus, and is sufficient to explain the rapid and temporary occurrence of hypermetropia. This view is supported by the diminished brightness of the anterior nuclear image during the persistence of the abnormal conditions.

A. J. Ballantyne.

V.—SURVIVAL OF THE CORNEA OUTSIDE THE ANIMAL BODY.

Magitot, A.—Experimental researches on the possible survival of the cornea preserved outside the organism, and on delayed keratoplasty. (Recherches expérimentales sur la survie possible de la cornée conservée en dehors de l'organisme et sur la keratoplastie différée.) *Ann. d'Oculistique*, juillet, 1911.

Magitot gives the results of a series of experiments which he has carried out with a view to ascertaining whether corneæ removed from the body can be preserved for any length of time without losing their vitality, and, if so, under what conditions this can be done, and, further, whether tissue from such corneæ can be transplanted, without losing its transparency, to replace leucomatous tissue.

Since Resingers in 1818 tried to replace an opaque cornea by one retaining its natural transparence, numerous attempts have been made to restore vision by corneal transplantation to eyes rendered useless through leucomata. These have shown that it is better to do a partial transplantation leaving Descemet's membrane intact rather than to remove the entire thickness of the leucomatous cornea, and that the graft must be homologous, *i.e.*, come from an animal of the same species as the one on which the operation is performed, as it would otherwise become opaque. Up to the present, a great obstacle to the performance of the operation has been the difficulty of getting suitable human grafts, which could only be obtained from (*a*) a clear part of the leucomatous cornea (*b*) the other eye of the patient if it were blind and the cornea clear (*c*) enucleated eyes with healthy corneæ within an hour of their excision. It is quite rare for suitable material from any of these sources to be available, but if means of preserving the vitality of the corneæ apart from the body for any considerable length of time could be discovered, the scope of the operation would obviously be much extended.

It has been long known that the different tissues of the body survive the nervous elements for periods varying according to their nutritive reserves, and that the duration of the survival can be increased by putting them under favourable conditions. Hedon and Fleig have shown that, under appropriate treatment, some of the tissues (*e.g.*, intestine, œsophagus) of mammalian animals can retain their contractility for a very long time, while Ljungren has succeeded in preserving pieces of skin removed during operations and using them for Thiersch grafting after an interval of weeks or even months. With a view to finding a method of similarly preserving corneæ and utilising them as grafts, A. Magitot has experimented on rabbits' eyes and found that if they are preserved at a constant temperature of between 6° C. and 8° C. in serum containing hæmoglobin from an animal of the same species, the corneæ remain

perfectly clear and retain normal histological characters except that some of the nuclei of the corneal lamellæ are oval instead of elongated, for more than 20 days, while by changing the serum every four or five days, he was able to keep one perfectly transparent until the twenty-fifth day. The serum used was obtained by bleeding an animal into a vessel containing a little distilled water and surrounded by ice.

To ascertain whether these apparently almost normal corneæ retained sufficient vitality to allow of their being used as grafts, Magitot performed a number of partial transplantations with them and found that they behaved exactly like grafts transplanted immediately from the eyes of living animals. There was practically no formation of new blood-vessels, and the transplanted cornea was almost as clear as that surrounding it, from which it was at first separated by a milky depression which gradually became less marked until at the end of ten months it could with difficulty be detected. There was also some astigmatism in the graft which gradually became less marked.

Histological examination of an eye removed 24 hours after transplantation into its cornea of a piece of cornea which had been preserved for 13 days, showed appearances exactly similar to those found at a similar period in an eye in which a transplantation had been done directly from a living eye. There was no infiltration with leucocytes. The graft had adhered perfectly without leaving any lacunæ, and three-quarters of its thickness was normal in appearance, but in the deeper fourth there was some degeneration (pycnosis), while the epithelium of the host had proliferated and filled up the gap around the graft, but made no attempt to replace that on the surface of the latter which appeared to have retained its vitality. These appearances were in marked contrast to those found in a case in which a dead graft was used, in which the parenchyma was swollen, the nuclei of the corneal lamellæ were round or oval, there were marked spaces between the graft and the tissue below it, and the epithelium of the host was spreading to replace that of the graft which had disappeared. In sections from a successful graft on the seventh day, there was good union, and the limits of the graft tissue could only be distinguished by a slight difference in the direction of its fibres. There were a few masses of degenerated fibres, and the thickness of the graft had been reduced, owing to the absorption of its deeper fourth, while its epithelium was reduced to three rows of cells. On the twenty-fifth day, the epithelium of the graft had resumed normal thickness, and its parenchyma could not be distinguished from the subjacent tissue, but there were nodes of contact at its edges and its lamellæ met those of the surrounding cornea at an angle, showing that the tissue had survived and not been replaced. At the end of two months, the appearances were practically the same as at the twenty-fifth day.

Magitot considers that there was a real survival of the transplanted tissue in the animals on which he experimented, because: 1. there was evidence of activity in the basal cells of the epithelium of the graft 24 hours after its transplantation; 2. there was no attempt on the part of the epithelium of the host to envelop the graft: and 3. the presence of contact nodes showed that the lamellæ of the graft were still present at the end of two months.

As further evidence of the retention of vitality in the tissues of eyes preserved according to his method, Magitot states that he was able by electrisation of the eye, to produce a slow dilatation of the pupil, which, from being round became oval, with its long axis directed towards an electrode placed at the corneal margin. R. J. COULTER.

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VI.—LIGHT, LIGHTING, AND GLARE.

(1) **Miller, W. T.—Injury to the eyes from exposure to intense light of short wave length.** *New York State Journal of Medicine*, December, 1909.

(2) **Parsons, J. Herbert.—Glare : its causes and effects.** *Lancet*, January 22nd, 1910.

(3) **McMullen, W. H.—Injurious effects of light on the eye.** *Ophthalmic Review*, April, 1910.

(4) **Fortin.—The problem of lighting by artificial means. (Le problème de l'éclairage par les sources de lumière artificielles.)** *Recueil d'Ophtalmologie*, mai, 1910.

(5) **Black, Nelson M.—Alternating illumination.** *Ophthalmic Record*, July, 1910.

(6) **Katz, R.—On the appreciation of the adequacy of illumination for work. (Sur l'appréciation de la suffisance de l'éclairage pour le travail.)** *Rev. d'Hygiène et de Thér. Oculaires*, août, 1910.

(7) **de Mets.—The artificial lighting of schools. (L'Eclairage scolaire artificiel.)** *Rev. Int. d'Hygiène et de Thér. Oculaires*, octobre, 1910.

(8) **Pleier.—Examinations into the lighting of school places. (Examens de l'éclairage des places d'école.)** *Rev. Int. d'Hygiène et de Thér. Oculaires*, janvier, 1911.

(9) **Truc, H.—The natural or day lighting of schools. (Eclairage naturel ou diurne des écoles.)** *Rev. Int. d'Hygiène et de Thér. Oculaires*, février, 1911.

(1) Certain rays of the spectrum may give rise to an inflammation of the eyes, the after-effects of which may persist for years. These waves begin in the blue part of the spectrum, and culminate one or two octaves beyond the violet part. It has been thought that the macula lutea and fovea centralis are injured. **Miller**, of Schenectady, N.Y., believes, however, that the mischief is rather due to the rays penetrating the sclera, just outside the lens, and thus injuring the ciliary body, to an affection of which he traces the symptoms of the ultra-violet burn. SYDNEY STEPHENSON.

(2) This paper, by **Parsons**, of London, on "Glare," read at a meeting of the Illuminating Engineering Society, does not seem to call for special notice in THE OPHTHALMOSCOPE. ERNEST THOMSON.

(3) **McMullen**, of London, sums up the results of the experiments and clinical observations on the effects of light on the eye: 1. on the superficial parts; 2. on the lens; and, 3. on the retina. Prolonged exposure to the electric arc causes conjunctivitis, corneal opacities and erosions, and hyperæmia of the iris, all of which can be prevented by the interposition of ordinary window glass, which absorbs all rays of less than 300 $\mu\mu$ length. Waves of greater length may also give trouble, to be avoided by glass which completely absorbs all the ultra-violet rays. Snow blindness is similary accounted for. With regard to the lens, it is possible that all rays reaching it, luminous or ultra-violet, may give rise to changes, but especially those between 300 $\mu\mu$ and 400 $\mu\mu$ wave length. The lens has the power of absorbing in youth nearly all rays of less than 375 $\mu\mu$, and in later life, all below that limit, but there is no evidence that these rays are a cause of cataract.

In the retina long exposure to intense light has produced degeneration of the nerve cells, but as the cornea and lens absorb most of the ultra-violet rays, the luminous rays must take some part in the causation. Erythropsia has been attributed to the ultra-violet rays, but experiment seems opposed to the view. Disturbance of colour-sense has also been observed after exposure to strong light and in snow blindness, generally in the form of a pericentral scotoma for red and green. The author concludes that all rays share in producing disturbances, the result of exposure to intense light, but that such are more liable to occur where there is a higher proportion of waves of short length. In his opinion, also, there is no evidence that serious damage may result from the use of the ordinary electric glow lamp, although some people may have discomfort where the filament is of the metallic variety.

A. H. PAYAN DAWNAY.

(4) **Fortin** questions the correctness of the view that blue light has a detrimental effect on the eye, and in any case the ultra-violet rays are largely arrested by the glass, which generally encases the source of light.

In the search for an artificial light which should be as much like daylight as possible, he finds that the mercury vapour lamp (rich in blue light), surrounded by a set of Edison lamps (rich in red rays), forms an ideal light. The Edison lamps at the same time supply the resistance which is necessary for the use of the mercury vapour lamp. J. JAMESON EVANS.

(5) **Black,** of Milwaukee, suggests that a device by means of which the intensity or illumination could be so gradually varied that the brain would be unconscious of the fact, might be useful in the elimination of the "*étire*" and headaches, which so often result when persons are compelled to stay any great length of time in a room too uniformly illuminated. It is supposed that it would act by means of a sort of "internal massage" which cleans out the blood and lymph channels with their effete material, and allows a fresh supply of blood and lymph to take its place, and so the eyes feel refreshed, or it may be that during the diminution of illumination there is a better chance for the renewal of the exhausted visual purple. J. JAMESON EVANS.

(6) **Katz,** of St. Petersburg, has found that 24/25ths of the lighting should be in reserve. In other words, that the lighting of the work table must be twenty-five times stronger than that which suffices to see the object of work. If a person can recognise the latter through a smoked glass which absorbs 96 per cent. of the light, therefore, the illumination must be considered as adequate for his occupation. On this principle he has constructed a simple apparatus— the "Light reserve meter," as he calls it—which consists of a sheet of paste-board provided with such smoked glasses, one for each eye, and a notch to take the nose. This appliance shows at once if the illumination is or is not sufficient for the eyes of the subject of the experiment. It is made by I. E. Mielck, optician, St. Petersburg. SYDNEY STEPHENSON.

(7) According to **de Mets**, of Antwerp, the conditions that determine good artificial lighting of schools are (1) an adequate intensity, and (2) a sufficient quantity of the light, be it gas, electricity, or other source. Most of the communication is taken up with a description (which contains nothing that is not nowadays common knowledge) of the rays given out by the various sources of artificial light. SYDNEY STEPHENSON.

(8) A mathematical study by **Pleier**, of Carlsbad, dealing with the lighting of school places. SYDNEY STEPHENSON.

(9) The following are the conclusions with reference to the day lighting of schools reached by **Truc**, of Montpellier.—As a rule, schools are insufficiently lighted. A good situation and a favourable orientation are indispensable. In towns, schools should be separated from neighbouring buildings by a distance at

least equal to their height. In the country, large open sites should be preferred, with a diagonal (east-west) arrangement of the buildings. Diffuse light should always be provided. School fittings and furniture should generally be light. In the case of new schools, architects should collaborate with hygienists and school inspectors, in order to secure good lighting. In old schools, windows should be elevated, and, if necessary, bilateral lighting, or upper lighting, or reflectors be arranged. The glazed portion of the windows should have at the least one-quarter of the superficial floor-space. At least 25° or 30° of the angle of the sky should be visible from the scholar's seat. In every school place, one should be able to read ordinary characters at a distance from the eyes of thirty centimetres. The minimum day lighting should be 10 "lux," or decimal candles, for ordinary schools, and 15 "lux" for schools of sewing, drawing, etc. SYDNEY STEPHENSON.

VII.—PRIMARY SYPHILIS.

(1) **Ginzburg, J.—Primary sores of the eyelids. (Initial-Sklerose der Augenlider.)** *Centralbl. für prak. Augenheilkunde*, Mai, 1910.

(2) **Wolfrum, M. and Stimmel, F.—Two cases of chancre of the conjunctiva. (Zwei Fälle von Primaraffect der Bindehaut.)** *Zeitschrift für Augenheilkunde*, Bd. XXIV, Heft ii.

(1) **Ginzburg**, in connection with a case of primary syphilis of the eyelid, reviews the whole subject of this affection as shown by Russian literature. He has collected twenty-seven clear cases from this source, and apparently it occurs more frequently in men than in women, and altogether occurs more frequently in Russia, than, for instance, in England, and this is due to the habit of using the tongue for the removal of foreign bodies from the eyes of comrades. Ginzburg's own case occurred in a midwife who got some drops of blood and liquor amnii into one eye while attending a confinement, and a month after the eye became troublesome. A typical sclerosed sore developed, followed by the secondary symptoms of syphilis. The disease ran a typical course. A. LEVY.

(2) **Wolfrum and Stimmel**, of Leipzig, describe two cases of primary sore on the conjunctiva, illustrated by a coloured plate. The first case occurred before Schaudin's discovery, but the appearance of a secondary roseola left no doubt as to the nature of the affection. The second case was similar, but the swelling was situated upon the palpebral conjunctiva, and was freely excised. In spite of this, however, secondary symptoms appeared. The details of the histological examination are instructive.—The tissue was placed for five days in the incubator in a two per cent. solution of silver nitrate. But fortunately, two pieces were removed earlier, one after twenty-four the other after thirty-six hours. Not a single spirochæte was found in the specimens which had remained in the solution. The tissue was washed, and embedded in paraffin in the ordinary way. Spirochætæ were found, and the Giemsa stained sections demonstrated that these organisms were in the lymph spaces. This shows how impossible it is to abort the disease by excision of the primary sore, for the spirochætæ are rapidly disseminated in the lymph stream. The primary sore was sharply differentiated from the secondary tissues by a large collection of lymphocytes, which spread all round the inflammatory tumour and formed a sharp boundary between it and the sound tissues. The vessels

showed a characteristic change : they were surrounded by a mantle- or cuff-like covering of lymphocytes. These were mononuclear and formed a 5-6 rowed shell round both blood- and lymph-vessels. In many places this infiltration reached to the tunica intima. The adventitia was chiefly affected. This change is seen both inside and beyond the confines of the tumour, and is typically characteristic of a primary sore. In the blood-vessels of medium size there was typical proliferation of the endothelium, and desquamation of cells narrowing the lumen. T. HARRISON BUTLER.

VIII.—SYMPATHETIC OPHTHALMITIS.

(1) Elschnig, A.—Studies on sympathetic ophthalmia. Part I.—The action of antigenes from within the eye. (Studien zur sympathischen Ophthalmies. I.—Wirkung von Antigenen vom Augeninnen aus.) von Graefe's *Archiv f. Ophthalmologie*, 14 Juni, 1910.

(2) Elschnig, A.—Studies on sympathetic ophthalmia. Part II.—The antigenic action of ocular pigment. (Studien zur sympathischen Ophthalmie. II.—Die Antigene Wirkung des Augenpigments.) von Graefe's *Archiv f. Ophthalmologie*, 30 August, 1910.

(3) Elschnig, A.—Studies on sympathetic ophthalmia. Part III. (Studien zur sympathischen Ophthalmie. III. Theil.) von Graefe's *Archiv f. Ophthalmologie*, 7 März, 1911.

(4) Deutschmann, F.—On the pathogenesis of sympathetic ophthalmia. Part I. (Zur Pathogenese der sympathischen Ophthalmie. Theil I.) von Graefe's *Archiv für Ophthalmologie*, 7 März, 1911.

(5) Deutschmann, R.—Addenda to the preceding paper of Dr. F. Deutschmann: "On the pathogenesis of sympathetic ophthalmia." (Zusatz zu der vorstehenden Abhandlung von Dr. F. Deutschmann: "zur Pathogenese der sympathischen Ophthalmie.") von Graefe's *Archiv f. Ophthalmologie*, 7 März, 1911.

(6) von Hippel, Eugen.—On Elschnig's theory of sympathetic ophthalmia. (Ueber Elschnig's Theorie der sympathischen Ophthalmie.) von Graefe's *Archiv f. Ophthalmologie*, 25 Juli, 1911.

(7) Elschnig, A., and Salus, R.—Studies on sympathetic ophthalmia. IV.—The antigenic action of eye pigments. (Studien zur sympathischen Ophthalmie. IV.—Die antigene Wirkung der Augenpigmente.) von Graefe's *Archiv f. Ophthalmologie*, 25 Juli, 1911.

(8) Deutschmann, F.—On the pathogenesis of sympathetic ophthalmia. Part II. (Zur Pathogenese zur sympathischen Ophthalmie. Part II.) von Graefe's *Archiv f. Ophthalmologie*, 25 Juli, 1911.

(9) Lafon, Charles.—Sympathetic ophthalmia. (Ophtalmie sympathique.) *La Clinique Ophtalmologique*, 10 août, 1911.

(10) Gradle, Harry S.—Blood condition in sympathetic ophthalmia. *Ophthalmic Record*, October, 1911.

(1) The first question to decide was whether the introduction of reacting substances into the eye produced corresponding substances (antigenes) in the serum. The experiments by **Elschnig,** of Prague, were conducted by injections of alien blood and of the bodies of the vibrio choleræ into the

anterior chamber and the vitreous. He found that the absorption of antigenes from within the eye was beyond doubt, but considerably smaller than after subcutaneous, and especially after intraperitoneal, or intravenous, injection. The antigenic action was much stronger if the animal has been previously immunised for the injected substance. Severe inflammation of the eye weakens, but does not destroy, the antigenic absorption, but seclusio pupillæ seems to do so, so far as injections into the vitreous are concerned.

R. GRUBER.

(2) **Elschnig**, of Prague, now proceeds to state his thesis regarding the explanation of sympathetic ophthalmia. By the antigenic absorption of damaged uveal tissue, a hyper-sensitiveness in the organism, and more so in the fellow eye, results, and thereby an increased reactive power. The slightest disturbance in the hypersensitive eye—say, the destruction of a single uveal cell—acts now like the supply of an anaphylactic agent from outside and with disastrous results for the vulnerable organ. Elschnig proceeds to supply experimental arguments in support of his theory. The general results of these experiments may be summarised as follows.—1. The intra-peritoneal injection of *alien* uveal tissue produces antibodies in the blood of the rabbit; these bodies are neither strictly organ-specific nor kind-specific; they inhabit in the complement the uveal emulsion of a different animal species and link with uveal emulsion, and consequently are ambiceptors. 2. The same immunity can be produced by the injection of uveal emulsion of the *same* animal species. 3. The antibodies of uveal immune-serum complement with chemically pure bovine eye-pigment. 4. By immunising with the latter, antibodies result, which are identical with those produced by uveal tissue. 5. The efficacious part of the uvea is therefore in pigment as far as antigenic action in immunisation and formation of the complement are concerned.

R. GRUBER.

(3) **Elschnig**, of Prague, now proceeds to the clinical aspects of sympathetic ophthalmia. A trauma injures the first eye seriously, and infection perhaps takes place; but here we must remember that the eye may also be affected by an organic anometism, and the injury be only the kindling cause for the outbreak. The uveal destruction leads to antigenic absorption, and thus, as we have seen, the hypersensitive irritation of the remaining parts of the uvea is the first and the priorly normal uvea of the second eye. A "somatic anomaly" finds here a point of action, and produces so-called sympathetic ophthalmia, the better name for which would be "anaphylactic iridocyclitis or uveitis." The best-known example of a somewhat similar process is the anaphylaxis in v. Pirquet's test, where the presence of tuberculosis renders the skin hypersensitive to the action of this toxine.

Elschnig deals in this paper more extensively with the "somatic disposition," which is the determining factor in the production of sympathetic ophthalmia. In analysing his 142 cases of iridocyclitis—traumatic and cases due to primary keratitis were excluded—he finds that in 37 cases, tuberculosis, syphilis, and acute infectious diseases, the usual determining causes, were absent, and thinks that even where they are found, their causal connection must always remain doubtful. In most of these 37 cases Elschnig assumes "auto-intoxication," generally from the gastro-intestinal tract, to have caused the eye trouble, and sees a confirmation of his suggestion in the frequent presence of indican in the urine; but he thinks that a disturbance of metabolism or a constitutional anomaly may be present, where the ocular symptoms are the only ones present. This would explain why different eyes react differently to infection. The distinction between idiopathic and traumatic iridocyclitis as to the production of sympathetic

ophthalmia is by no means so sharp as most people think. Severe idiopathic iridocyclitis is very liable to attack the other eye (99 out of 216 cases in Schnabel's statistics) and is then generally all the more dangerous and leads to the worst forms of visual impairment; on the other hand, sympathetic ophthalmia is not quite so deleterious as some believe (recovery is more than 14 per cent. according to Schirmer). It must also be remembered that in all five cases where a *post-mortem* examination after sympathetic ophthalmia was feasible, signs of "somatic disturbances" were indeed always present (nephritis in three cases, complicated once with cerebral tumour, once with tuberculosis, and once with endocarditis; carcinoma ventriculi in the fourth; and septic meningitis in the fifth case). Elschnig concludes by saying that although his investigations are of no help as regards diagnosis, yet they are of considerable assistance as regards treatment. It is not enough to resort in time to excision or exenteration of the eyeball: medical and dietetic treatment are quite as essential. Radical treatment is also imperative where idiopathic iridocyclitis has so far implicated an eye that restoration of useful vision is impossible, as the other eye is liable to be affected. R. GRUBER.

(4) The most interesting point in this communication by **F. Deutschmann**, of Hamburg, is the fact that he was able to produce sympathetic ophthalmia in the monkey by implanting particles of choroid, of the optic nerve, and chorioidal emulsion from a human case, the substances having previously proved aseptic. In the same way the disease could be conveyed from one monkey to another and to the rabbit. The path of infection leads, according to Deutschmann, along the lymphatic sheaths of the optic nerve, either directly or first along the anterior ciliary vessels out of the eyeball, then along the external eye muscles, and, again, backwards to the vaginal tissues. All the affected animals developed changes in the coverings of the optic nerve, three out of four also meningitis, and all inflammatory symptoms along the sympathised optic nerve. The inroad of the noxious agent is also two-fold as far as the second eye is concerned; through the lymphatics into the choroid and with the central vessels to the optic disc and the vitreous; or first into the orbit, eye muscles, anterior ciliary vessels and thus into the ciliary body. This latter mode explains why optic neuritis is comparatively rare in sympathetic ophthalmia. At the same time Deutschmann points to several facts, especially to the contribution of Ramsay and Sutherland, who found that a slight myopia, hyperæmia of the disc, and fusiform enlargement of the blind spot are very often the first symptoms of impending sympathetic ophthalmia. He thinks that a slight or localised meningitis may often be present round the chiasma, without causing any marked clinical symptoms. He cannot entirely agree with Fuchs as to the pathognomonic importance of the histological aspect of sympathising endophthalmitis, as the same appearance may be caused by idiopathic and also by non-sympathising traumatic irido-choroiditis. R. GRUBER.

(5) **R. Deutschmann**, of Hamburg, attaches great importance to F. Deutschmann's paper, as it seems to overcome the objections which Roemer raised against the former's migratory theory. F. Deutschmann's investigations seem to explain how sympathetic ophthalmia can supervene after optico-ciliary resection, as the infection might extend towards the orbital tissue and effect the optic nerve higher up. The rest of R. Deutschmann's paper is occupied by a polemic against Roemer. R. GRUBER.

(6) This is a criticism of Elschnig's theory which **v. Hippel**, of Halle, considers unproved, although he acknowledges its theoretical interest. His principal objections are: (1) Elschnig requires for the production of sym-

pathetic ophthalmia two conditions: the anaphylaxis of the uvea by the destruction of uveal tissue (principally pigment); and, secondly, a somatic anomaly, so that quite healthy people really never could acquire sympathetic ophthalmia after even the worst perforating injury. But there is really no analogy whatever for this kind of anaphylaxis which could take effect only in a diseased organism. In its generally accepted meaning, Elschnig's anaphylaxis would be quite sufficient in itself to produce the pathological reaction in the other eye, and v. Hippel thinks that Elschnig only introduces somatic anomaly as a determining factor because he could not otherwise explain why sympathetic ophthalmia is not of more frequent occurrence, where uveal tissue is fully destroyed. After non-perforating gunshot wounds of the orbit, where the changes in the choroid and the disturbance of the ocular pigment are enormous, no one ever thinks of the possibility of sympathetic ophthalmia, and the same remark applies to disseminated choroiditis, myopia changes, etc. (2) Why should the double spontaneous iridocyclitis, which Elschnig treats as an equivalent of sympathetic ophthalmia, the pathology of the process be different in the two eyes, caused by auto-intoxicosis in the first one and by anaphylaxis in the other. (3) The identity of spontaneous iridocyclitis and sympathetic ophthalmia is not proved. If the anatomical appearance is not sufficient to prove the presence of specific micro-organisms, its similarity does not prove the anaphylactic character of the inflammation. (4) The importance of auto-intoxication for the production of iridocyclitis and of the presence of indican for morbid metabolism are very doubtful. R. GRUBER.

(7) This is a report on further experiments dealing with the antigenic action of chemically pure choroidal pigments, and amplifies and confirms the results of the first series. **Elschnig** and **Salus**, of Prague, injected the pigment into the veins, and found that the antigenic action was most decidedly specific for the organ and not for the species, although slighter towards the same species. It seems that the pigment was the only active part of the whole choroidal tissue as far as its antigenic action was concerned. R. GRUBER.

(8) **F. Deutschmann,** of Hamburg, reports further experiments. One of them refers to a monkey where sympathetic ophthalmia was produced by implanting a piece of optic nerve from the sympathized eye of the monkey whose case was reported in the first paper. Other cases refer to eyes of four patients, two of whom had been suffering from sympathetic ophthalmia and the other two from post-traumatic iridocyclitis. Parts of these eyes also sometimes produced sympathetic ophthalmia in the rabbit, the infection spreading along the optic nerves and occasionally affecting the meninges. The author considers that the bacillary origin of the affection and the migration of the infection along the optic nerves are thereby firmly established. Not all bacilli which enter an injured eye cause an outbreak in the other, but this is not due to any specific anatomical changes in the first eye, but to special characteristics of the micro-organisms; they must be inclined to spread along the lymphatics, exceed a certain number, and possess a minimum of virulence. The development of typical endophthalmitis out of simple fibro-plastic inflammation takes place simultaneously with the migration of the bacilli, and is, as a rule, completed when the bacilli reach the second eye. The success of a well-timed enucleation is not so much due to the removal of infective material as to the opening of the lymphatics which causes a current towards the elimination of the bacilli. The author also discusses the question of the prevalence of the various cell forms in inflammation. He points to the frequency of the plasma cells and to their close relation to the lymphocytes, their real connection with the latter still being a matter of some doubt, although F. Deutschmann

considers the lymphocytes as the secondary product. Plasma cells in small number are normally present in the ciliary body and in iris of the rabbit, as well as within and in the neighbourhood of the lacrymal gland. R. GRUBER.

(9) **Lafon,** of Périgueux, relates at full length a case in which detachment of the retina, cyclitis, and secondary glaucoma was followed by sympathetic ophthalmia a month after an iridectomy. There was no history of any original injury and no sign of trouble in the other eye until an operation had been performed, and that at a time when, as the author himself admits, enucleation was the correct procedure. ERNEST THOMSON.

(10) *Apropos* recent communications by Ormond and Jones and Browning respectively (see abstracts in THE OPHTHALMOSCOPE, July, 1911, p. 528), concerning the condition of the blood in cases of sympathetic disease, **Gradle**, of Chicago, points out that he read a paper dealing with the same subject at the Heidelberg Congress in August, 1910 (see abstract in THE OPHTHALMOSCOPE, October, 1911, p. 716). In such cases he found a large increase in the lymphocytes and a slight increase in the large mononuclears, or exactly the reverse of the condition discovered by Ormond. Gradle now claims that, in reality, the two pictures are the same, "because the differential diagnosis between a large mononuclear and a lymphocyte is more a personal equation than anything else." On this account, in a later communication, he maintained that mononucleosis was the deciding factor from the diagnostic standpoint.

SYDNEY STEPHENSON.

IX.—DETACHMENT OF THE RETINA IN PREGNANT WOMEN.

Verderame, Sh.—**On non-albuminuric and albuminuric detachment of the retina, and its re-attachment, in pregnant women. (Ueber nichtalbuminurische und albuminurische Netzhautablösung und ihre Wiederanlegung bei Schwangeren.)** *Klin. Monatsbl. f. Augenheilkunde*, April, 1911.

To the few cases reported in literature of retinal detachment occurring during pregnancy in the absence of albuminuria—but in the presence of myopia—**Verderame** adds an observation of his own.—This patient, 29 years old and pregnant for the fourth time, had in her eighteenth year undergone removal of the right lens on account of high myopia. In the second half of her first pregnancy the sight of the left eye became much worse. Examination four years later revealed an extensive detachment of the retina in this eye, while in the right eye, which had vision of 5/30 and a still myopic refraction of 1.5 D., there were vitreous opacities and myopic changes in the choroid. In the fourth month of the fourth pregnancy the right retina, too, became detached. About three weeks after this event, artificial abortion was carried out. Twenty days later, the right amotio retinæ had disappeared, and after a further lapse of a few weeks, vision and field of the right eye were as good as before the detachment. This recovery in the wake of abortion makes it particularly probable that the pregnant state really was the cause of retinal detachment in a predisposed eye.

Amotio retinæ is not such a very rare complication of retinitis albuminurica gravidarum. Verderame records an observation of this kind. After artificial abortion on account of albuminuria, a bilateral detachment of the retina, retinal hæmorrhages, and white spots were discovered in a woman, aged 30

years. Two months later, the fundus and the functions of the eyes were again quite normal. After a few years, the patient died from cerebral hæmorrhage, when it was possible to prove that the recovery from retinal detachment was complete, also in an anatomical sense. Microscopical examination of the eyes showed no trace whatsoever of the former amotio. All that was found were some recent retinal hæmorrhages and extensive sclerosis of the choroidal vessels. C. MARKUS.

X.—VACCINIA OF THE EYELIDS.

(1) **Bednarski, A.—A case of vaccinal infection of the eyelids.** *La Clinique Ophtalmologique*, 10 octobre, 1910.

(2) **Hilbert, R. — Secondary vaccinia infection of the eye. (Zur Kenntnis der sekundären Impf-Verletzungen des Auges.)** *Centralbl. f. prak. Augenheilk.*, März, 1911.

(1) **Bednarski,** of Lemberg, gives a lengthened description of a case of bilateral vaccinal auto-infection of the eyelids and of one auricle in a boy, aged four years. According to this writer, the condition is very rare. He knows of fifty reported cases only. These mainly concerned adults: nurses infected by vaccinated infants. Auto-infection occurred only nine times. Usually, the eyelids of one eye, rarely of both, were infected. According to the statistics of Schirmer in the second edition of *Graefe-Saemisch*, the eyelids were primarily involved 43 times, the conjunctiva 3 times, and the cornea once in 47 cases, and according to Groenouw, in the same work, all symptoms usually disappear in two or three weeks. In the case at present under consideration, the skin of the eyelids was still red and slightly swollen at the end of two months.

It may not be out of place for the abstractor to remark that the cases may not perhaps be so rare as Bednarski imagines, since at least two cases of palpebro-conjunctival vaccinia come to his recollection as having occurred in his own out-patient experience. In these the diagnosis was easy, and, as the experience of others proves to be usual, the cure was complete. It is possible that these characteristics of easy recognition and complete curability have gone against the publication of numbers of cases of what is the most commonplace of infections, only in an uncommon situation. ERNEST THOMSON.

(2) Many cases of vaccinia of the eye and its adnexa have been reported, and everyone must have seen cases. But usually the cases are infections of other persons from a vaccinia pustule, as, for example, the mother or nurse of a child. Direct auto-infection must be rare on account of the immunity produced in the individual itself, with the exception of the cornea, which does not become immunized, and some cases of auto-infection of the cornea with vaccinia have been reported, but **Hilbert,** of Sensburg, records a case of auto-infection of the lid-margin in a girl, aged twelve. The original pustules were on the arm, and were beginning to heal when the girl scratched them on account of the itching and infected both eyelids of the right eye. There were three typical small vaccinia pustules, which were situated exactly on the intermarginal borders, and which healed, leaving a small scar. The fact that the patient had a marginal blepharitis may explain the ease of inoculation at that site, and possibly also a delayed immunity. A. LEVY.

XI.—CORNEAL AFFECTIONS IN ACQUIRED SYPHILIS.

1 Mandonnet.—Superficial keratitis and acquired syphilis. (Kératite superficielle et syphilis acquise.) *Ann. d'Oculistique*, février, 1910.

2 Almat, Marin.—A contribution to the study of interstitial keratitis in acquired syphilis. (Contribucion clinica al estudio de la queratitis intersticial en la sifilis adquirida.) *Arch. de Oftal. Hisp.-Amer.*, Junio, 1910.

(1) **Mandonnet** records a case of relapsing corneal ulceration, resembling herpes, and a case of peripheral sclero-corneal nodule, resembling episcleritis, both of which were of syphilitic origin. He insists on the fact that interstitial keratitis is not the only form under which syphilis, whether hereditary or acquired, can attack the cornea. R. J. COULTER.

(2) **Almat** contributes five cases to those already recorded of interstitial keratitis in acquired syphilis. He points out that there are two characters which often serve to distinguish the keratitis of acquired from that of hereditary syphilis: the lesion is often unilateral, and limited in extent. There are, however, he says, a fair proportion of cases which do not bear out this rule, and the diagnosis is therefore by no means always simple. Treatment is much more efficacious in the acquired form than in the hereditary disease. Careful notes are given of the progress of the five cases which have occurred under his charge. HAROLD GRIMSDALE.

XII.—LOCAL ANÆSTHESIA IN ENUCLEATION OF THE EYEBALL.

Seidel, E.—A modification of Siegrist's method of local anæsthesia in enucleation and exenteration of the globe. (Ueber eine Modification der Siegristschen Methode der Lokalanästhesie bei Exenteratio und Enucleatio bulbi.) *Klin. Monatsbl. f. Augenheilkunde*, September, 1911.

Siegrist's method (described in *Monatsblätter*, Bd. XL, 1907) is briefly as follows.—The conjunctiva is first anæsthetised. A 2 per cent. novocain-adrenalin solution is then injected through a long curved needle to the region of the optic and ciliary nerves. Four injections are made, up, down, in, and out, 0.75 ccm. being used at each point.

In the experience of **Seidel**, of Heidelberg, this is often painful, and may fail to give satisfactory anæsthesia. Siegrist has recently tried to improve it by increasing the total amount of fluid used to 5 ccm. Seidel, having anæsthetised the conjunctiva with 10 per cent. cocaine, injects 1-2 ccm. of novocain-adrenalin solution (1 per cent. novocain with 0.5 of a drop of adrenalin solution to each ccm.) in a circular manner round the cornea, and 4 mm. from its border. The deep injections are then made. A straight needle 5 cm. long is used. It is inserted upwards, downwards, outwards, and inwards, over the muscular insertions, and pushed backwards to a point midway between the optic nerve entrance and the optic foramen. At each of the four points 1 ccm. of the solution is injected along the course of the needle as it goes, and another ccm. when it has been pushed home. This

procedure causes some exophthalmos and great œdema of the lids. The latter is reduced by pressure, and in twenty minutes the operation can be done without the slightest pain. Healing is natural. The advantages of the method are the painlessness of the injections, the completeness of the anæsthesia, the anæmia of the parts, and the exophthalmos, which facilitates operation. It is, of course, contra-indicated in the presence of infective conditions of the conjunctiva. A. J. BALLANTYNE.

XIII.—CONGENITAL AND HEREDITARY SYPHILIS.

(1) **Scalinci Noè. — Miliary gummatous iritis of hereditary syphilis. (Iridite gommosa miliare da eredo-sifilide.)** *Riv. Ital. di Ottal.*, settembre-ottobre, 1908.

(2) **Fuchs, E. — Malformation of the cornea in cases of inherited syphilis.** *Ophthalmic Review*, September, 1909.

(3) **Beauvieux.—Syphilis and interstitial keratitis in infancy. (Syphilis et kératite interstitielle de l'enfance.)** *Archives d'Ophtalmologie*, octobre, 1910.

(4) **Galezowski, J. — Hereditary syphilitic interstitial keratitis and choroiditis. (Keratite interstitielle et choroidite hérédo-syphilitiques.)** *Recueil d'Ophtalmologie*, novembre, 1910.

(5) **Dorrell, E. A.—A drawing showing unusual appearance of the iris in congenital syphilis.** *Trans. Ophth. Society U.K.*, Vol. XXXI, Fasc. 2, p. 47, 1911.

(1) True gumma of the iris is one of the rarest diseases of the eye. **Scalinci's** case was a young girl, aged 14, who, as the result of sitting a whole evening in damp clothes, was attacked by redness in both eyes. Within a few days, there was a severe attack of iritis in the left eye, and hyperæmia of the right iris. In view of the supposed rheumatic origin of the iritis, she was given salicylates internally, in addition, of course, to atropine locally. In a few days, the eyes had much improved, but suddenly the left eye underwent a relapse. A fortnight later, there was seen at the base of the iris, a small nodule of oval shape with the long axis vertical; a little internal to this, were two other smaller, but otherwise similar, nodules. It became clear that the iritis was not rheumatic, but either syphilitic or tuberculous. About this time the cornea began to take part in the inflammatory process, and there was noted a parenchymatous infiltration in the infero-internal third. "This," says the author, "was of a type absolutely new to me. It resembled a mosaic, with the elements separated each from each by a short distance, and together forming a triangle with the base at the intero-internal periphery and the apex barely reaching the pupillary region of the cornea."

The right eye showed no abnormality, even in the fundus, which was carefully examined in the hope of gaining some information as to the nature of the affection of the left eye. There were no other signs to suggest hereditary syphilis in the child, but the father had suffered from some affection of the throat which had been cured by mercurials. An energetic treatment of the same kind was begun, and in a short time the eye recovered almost completely. The last note showed some slight turbidity of the vitreous.

H. GRIMSDALE.

(2) **Fuchs,** of Vienna, has noted that in some cases of interstitial keratitis the cornea is a vertical ellipse, whereas normally it is a horizontal oval in front, but circular if viewed from behind after dissection. He collected 28 cases (20 females and 8 males) in which one or both corneæ were vertically oval.

Interstitial keratitis	14
Chronic iritis...	5
Unilateral congenital cataract	1
Corneal opacities ? strumous	2
Senile cataract	6
	28

Omitting the six senile cases of the remaining 22, eight showed good evidence of syphilis, eight some indication, and six no signs. Half the interstitial keratitis cases were fresh, in the others the opacities were of long standing, and only detected after examination on account of the abnormal shape of the corneæ. From these figures Fuchs concludes that oval cornea, apart from congenital malformation, is more frequent in cases of inherited syphilis, and especially in those where keratitis may occur, but it is not by itself a proof of the disease. The condition is generally present in both eyes, but in six out of 28 it was monocular: an inverse astigmatism, generally between 3 and 5 dioptres, was found in most of the cases, with the flatter meridian down and out. A. H. Payan Dawnay.

(3) **Beauvieux**, of Bordeaux, at the instigation of Lagrange, has examined twelve cases of interstitial keratitis (not specially chosen) with a view to obtaining evidence to answer the questions:—1. Are all cases of interstitial keratitis syphilitic in origin? 2. Where the syphilitic diathesis has been recognised as a definite ætiological factor, has anti-specific treatment a real value in arresting the disease? The twelve cases were clinically undoubted examples of the disease, and all except two were seen before any treatment had been begun. All gave more or less evidence in the family history of syphilis in the parents, and most showed more or less marked signs of heredo-syphilis. Wassermann's reaction was carefully carried out in all, and was positive in the ten untreated cases, but negative in the two that had already received treatment. These two were both in lads of 18—one showing well marked stigmata of congenital syphilis and with a definite history in the parents, had been treated with tonics for eighteen months; the other with slight signs only, had had similar treatment for three years.

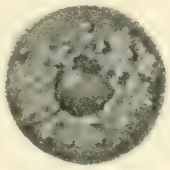
These results, taken in cases as they occurred, give a percentage of 83, in which syphilis was an undoubted ætiological factor. Beauvieux is strongly in favour of anti-syphilitic measures in the treatment of such cases, with or without general tonic treatment. Bernard Cridland.

(4) The conclusions reached by **Galezowski**, of Paris, on this subject are.—That interstitial keratitis, which may be a complication of acquired as well as of hereditary syphilis, is almost always accompanied by atrophic and pigmentary changes in the choroid, generally in the region of the ora serrata, and can generally be seen by careful ophthalmoscopic examination when the corneal affection clears up. Mercury or mercury and iodide should form the treatment in interstitial keratitis and should not be discontinued until it is certain that the choroidal lesions have become quiescent.

J. Jameson Evans.

(5) In the left eye of an infant of three months **Dorrell**, of London, observed the curious nodular condition of the iris shown in the drawing. The tension of the eye (which was inflamed) was *plus* 2. The cornea was steamy.

No reflex could be obtained from the fundus. The evidence that the lesion was of syphilitic nature depended upon the several facts—first, that the Wassermann reaction was positive both in the baby and her mother; secondly, that the v. Pirquet reaction was negative; and, thirdly, that inunctions of mercury led



to considerable improvement in the state of the eye. Indeed, within a period of thirty-nine days, the eye had become quiet, the tension normal, and the exudates had cleared up, leaving the pupil closed by membrane.

SYDNEY STEPHENSON.

XIV.—REMEDIES.

(1) Ohm, J. — The employment of vibratory massage in secondary glaucoma, following swelling of the lens. (Die Vibrationsmassage bei Sekundärglaukom infolge von Linsenquellung.) *Centralbl. für prak. Augenheilk.*, Januar, 1911.

(2) Pons, Marques.—Treatment of angiomata of the lids by means of electrolysis. (Tratamiente de los tumores angiomatoses de los parpados por la electolisis.) *Arch. de Oftal.*, Marzo, 1911.

(3) Wirtz, Robert. — Results with Koster's method of continuous drainage of the lacrymal passages. (Erfahrungen mit der Dauerdrainage des Tränennasenkanals nach Koster.) *Wochenschrift f. Therapie u. Hygiene d. Auges*, 13 and 20 April, 1911.

(4) Grunert.—Terminol, a new citrate of copper ointment for the treatment of trachoma and follicular conjunctivitis. (Terminol, ein neue Cuprum-citricumsalbe zur Behandlung von Trachom und Conjunctivitis follicularis.) *Zeitschrift für Augenheilkunde*, Juni, 1911.

(5) Elliot, R. H.—The treatment of granular ophthalmia and its complications by the sub-conjunctival injection of a solution of cyanide of mercury. *Ophthalmology*, July, 1911.

(6) Ohm, J.—On the treatment of detached retina by surgical removal of the subretinal fluid and injection of air into the vitreous. (Ueber die Behandlung der Netzhautablösung durch operative Entleerung der subretinalen Flussigkeit und Einspritzung von Luft in den Glaskörper.) von Graefe's *Archiv f. Ophthalmologie*, 25 Juli, 1911.

(7) Elliot, R. H.—The treatment of granular ophthalmia and its complications by the sub-conjunctival injection of a solution of cyanide of mercury. *Indian Medical Gazette*, September, 1911.

(8) Lawson, Arnold. – Two cases of metastatic ocular inflammation associated with bacillus coli toxæmia. *Trans. Ophthal. Society U.K.* Vol. XXXI, Fasc. 3, p. 271, 1911.

(1) A very suggestive case is related by **Ohm,** of Bottrop, anent the employment of vibratory massage on the eye.—He did a needling for a lamellar cataract in a patient 36 years of age This was followed by some swelling of the lens and raised tension. A curette evacuation relieved the condition for a short while, until more lens matter came forward, when the tension recurred. A second curette evacuation removed almost the whole lens, but a few days later, tension again recurred, which was not controlled by eserine or moist dressings. He then had recourse to vibratory massage, using the instrument described by Piesbergen twice a day for about three minutes each time. The tension was immediately reduced, the cornea became clear, and the small remaining lens masses were broken up into very fine particles. The effect was purely transitory, but still, with an application twice a day, the tension was controlled, and the ultimate result was very good. The instrument makes about 2,000 vibrations to the minute and is applied over the closed lids. A. LEVY.

(2) **Marques** thinks that the best results can be obtained in these conditions by the use of monopolar negative electrolysis. If the needles are attached to the negative pole, it is indifferent of what metal they consist. He uses a current of from 10 to 25 milliampères. HAROLD GRIMSDALE.

(3) **Wirtz,** of Düren, gives with considerable detail notes of the treatment of twenty-one lacrymal cases with Koster's thread method. He found it successful in cases of simple stricture, or simple dacryocystitis. After long-standing sclerotic strictures there was more difficulty, and excision of the sacs had to be undertaken. The case of atony and ectasiæ of the sac were scarcely satisfactory, and excision followed Many of the cases required further treatment, while the thread was in position, to prevent acute suppuration, which supervened in one instance. The author advises radical treatment in place of Koster's procedure in the following cases.—(1) Acute suppurative dacryocystitis; (2) polypi of the mucous membrane; (3) trachoma of the lacrymal passages; (4) syphilitic or tuberculous disease; (5) nasal disease, which is difficult to cure, *e.g.*, ozœna. Direct indications are.—(1) Chronic suppuration with purulent discharge; (2) fistula formation; (3) old fibrous sclerotic strictures. For new bone formation, a new passage may be formed by this method *cf.*, THE OPHTHALMOSCOPE, Vol. VIII, p. 750.
W. B. INGLIS POLLOCK.

(4) **Grunert,** of Bremen, has had much experience in the treatment of trachoma, a disease of which he at one time was accustomed to treat from 50 to 150 cases a day. He regards operative measures as the best, but under certain circumstances they are not admissible, and other methods must take their place. Thus, when there is much secretion, silver nitrate, in 2 per cent. solution, and argyrol, in 5 per cent. solution, are most suitable. In transition forms, powders are the best. In the dry stages, a copper ointment should be selected. Copper citrate was for a time extensively prescribed, but latterly it has been tacitly dropped by most surgeons, and for many reasons, chiefly on account of its irritating nature. These many disadvantages have been entirely overcome by a new preparation which has been elaborated at Bremen, called "Terminol." It is put up in tubes by Messrs. Felix Schmiedchen, and can be readily obtained. T. HARRISON BUTLER.

(5) **Elliot,** of Madras, who has given this treatment a fair trial in a small number of cases, comes to the following conclusions: it did not cause atrophy of the granulations; it did not remove the pannus, but made it worse in some cases; it caused very severe pain and considerable local reaction; in four out of six cases its use was followed by ptosis. He has abandoned the treatment, and fallen back on his former routine, *viz.*, roller forceps, silver

nitrate, copper sulphate, yellow oxide of mercury, and dionin, with peritomy in cases where the pannus does not clear with improvement in the lid condition. A. J. BALLANTYNE.

(6) The unsatisfactory results of treatment for detached retina are seen from Uhthoff's statistics. Amongst 422 cases, only 36 recovered, *viz.*: eighteen spontaneously, ten by "pacific" means, and eight by surgical treatment

The method adopted by **Ohm**, of Bottrop, which was successful in one out of two cases, was as follows.—Dissection of a conjunctival flap, short meridional incision with the iridectomy knife. Introduction of Pravaz's syringe with a stout needle, aspiration of the subretinal fluid; a second syringe is then thrust into the vitreous and air (one c.cm. in his first case) injected into the vitreous. The air bubbles appeared in the anterior chamber, but were soon absorbed. The idea is to maintain the intraocular pressure. Ohm quotes Stilling to the effect that the vitreous consists of a fluid core and a solid cortex, the first of which can be easily replaced, while the latter is essential.

R. GRUBER.

(7) Six trachomatous patients were treated exactly in accordance with the description given by Lieut.-Colonel Henry Smith of his method by subconjunctival cyanide injections [*See* THE OPHTHALMOSCOPE, Vol. VII, (1909) p. 635, and Vol. VIII (1910), p. 843]. One eye of each patient was treated by the injections, and the other eye, as a control, by roller forceps, silver nitrate, etc., in the routine way. Two patients received one injection only, one patient two injections, one patient three, and two patients four injections.

Elliot, of Madras, did not find that the cyanide exerted any specific influence whatever upon the palpebral condition, and in three cases out of the six, he had to fall back upon the usual methods for the cure of the disease.

In two severe cases the treatment caused a grave exaggeration of pannus, though in two milder cases the corneal condition was improved by the injections. But the improvement in these two eyes was no greater than that obtained by the ordinary means in the fellow eyes. Further objections to the cyanide injections, as used by Smith, are (1) the extreme pain caused by them, and (2) ptosis seen in four cases of the six. This ptosis Elliot attributes to paresis of the levator, and not to any mechanical obstruction to the lid movements. In one case dense scarring was attributed to the conjunctival reaction from a single injection.

For severe pannus, which does not yield to the ordinary treatment of the lids, Elliot relies upon peritomy. Adrenalin is avoided, and all the deep episcleral vessels are torn through.

The reviewer would like to add here some personal experiences.—He has obtained quite exceptionally good results in active trachomatous pannus, with and without corneal ulceration, by replacing the usual applications of silver nitrate solution with perchloride irrigation of the conjunctival sac. The irrigation is with 1 in 3,000 solution, repeated daily at first. The lids are everted, and kept in motion to aid in the free penetration of the fluid to the fornices. The irrigation is continued, generally for half a minute or more, until a barely perceptible superficial pallor is noticeable on the reddened palpebral conjunctiva. Atropin instillations are used also, as required. Commonly, within a few days, definite improvement begins, enabling the frequency of the injections to be reduced. The treatment is useful also in many non-trachomatous corneal ulcerations. H. HERBERT.

(8) **Lawson**, of London, reports a couple of cases of ocular inflammation which he believes to have been caused by an excess of the B. coli in the

urine. The facts briefly follow.—1. A young lady suffered from intense papillitis of one eye (V. = 6/12 barely) of six days' duration. The condition was associated with an offensive condition of the urine, seemingly due to the presence of the B. coli. The administration of full doses of helmitol led to recovery of sight (V. = 6/5), and to a normal state of the urine. The visual field, however, showed a blind sector. 2. A woman, of 36 years, was admitted to hospital for the treatment of a recurrent vesicular keratitis. A scraping, made from one cornea for purposes of bacteriological examination, was followed, within a few hours, by an abundant muco-purulent discharge from the eye, and next day by an extensive infiltration of the cornea. Examination of the urine disclosed an offensive condition. It contained some pus, and was found to be teeming with B. coli. The result of injecting a vaccine from the urine was little short of marvellous. As the author remarks, "The whole process seemed to cease as if by magic." Seven weeks from the onset of the mischief, V. was 6/36, or where it had been prior to the acute attack. But the urine, curious to relate, still contained B. coli in excess.

SYDNEY STEPHENSON.

BOOK NOTICES.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. XXXI, Fasc. 3, 1911. London: J. and A Churchill, 7, Great Marlborough Street. Price 4s. net.

This fasciculus, issued to members of the Society on November 16th, 1911, completes the record of the work accomplished during the last session. It includes Landolt's Bowman Lecture.

The Royal London Ophthalmic Hospital Reports. Vol. XVIII, Part ii, September, 1911. Edited by William Lang. London: J. and A. Churchill, 7, Great Marlborough Street. Price 5s. net.

Of the six communications contained in the present number of the *Reports*, A. C. Hudson is responsible for four and G. Coats for the remainder. As usual, the part is liberally illustrated.

Pyramidal Cataract. (La Catarratta piramidale.) By DR. E. PASSERA. From the *Ophthalmological Clinic of Turin.* 1911.

Passera describes in this paper with great minuteness the details of a case of pyramidal cataract which he saw in the clinic of Professor Raymond. In this case there was a history of congenital syphilis and signs of irido-choroiditis, possibly intrauterine in origin. Passera gives a profuse *résumé* of the literature of the subject, which shows that cataract of this type is not always the sequence of a perforating ulcer of the cornea. In the author's case the presumption is that the cataract is the result of iritis (or irido-cyclitis) setting up a toxic condition of the aqueous humour which gives rise to irritation of the lens tissue. A copious bibliography concerning pyramidal cataract is given. The paper is illustrated by a plate showing the physical characters and microscopic appearance of the tissue of the cataract in his case.

GLASGOW. LESLIE BUCHANAN.

Psychology of the Space-perception of the Eye. By Dr. STEPHEN WITASEK, Heidelberg, 1910. (Octavo, cloth boards.) Price, 7 marks.

This is one of a series of monographs on the various departments of psychology, under the editorship of the late Prof. Ebbinghaus and Prof. E. Meumann.

The scheme comprises some six and twenty volumes, of which this is the second, and nineteen others are in preparation by various well-known psychologists of Germany, Austria, and Switzerland.

The present volume consists of 455 closely-printed pages with references to some 275 papers, principally in the German language. It is divided into five chapters, whereof the second, dealing with the physiological side of the matter, is the longest. The author discusses first what may be termed the local peculiarities of the retina, the blind spot—minimum visible—the boundaries of the visual field, and, in general, vision with the eye at rest. He then passes on to binocular vision under the same conditions, with especial reference, in both cases, to the perception of distance. The last half of the chapter deals with space-perception when the eye is free to move, with special reference to Hering's views on the subject. The third chapter treats of our perception of form and of movement in space. In the fourth chapter the function of experience is discussed.

The book is well planned and well written. It is quite frankly an exposition of the author's own views with regard to the controversy between the "Nativists," who hold that we perceive space through the medium of a special sense, and the "Empiricists," whose view is that all our knowledge of it comes from experience. The author quotes both sides with perfect fairness, and refers to papers of the most recent date up to the moment, as it would seem, of going to press.

Excellent as the book is, there are, however, experiments and considerations which, I venture to think, modify the author's conclusions. It is in some sort begging the question to speak, as on page 76, of the connection between convergence and accommodation as "normally automatic," unless it is made quite clear that we apply the term simply to actions that are habitually associated, without implying that they are congenitally and necessarily so. There is abundant evidence that quite young children voluntarily dissociate them. I have come across many who have discovered the "*Tapeten-Bilder*" for themselves, and could not only make a small patterned wall-paper look nearer by converging without altering the focus from what it was, but by relaxing the axes with the eyes focussed on the much smaller pattern on a cardboard box, could make it look bigger, and a long way off. I well remember how after playing at this—and being punished for "squinting"—it was some time before our eyes "came right," and the habitual relations of convergence and accommodation were restored.

Moreover, in the ordinary use of the eyes we converge the axes first—usually in the act of directing the eyes to the object—and focus *when we have fixed it.*

I have employed the following experiment to show how much longer it takes to accommodate than to converge the eyes to a given distance. Let there be two objects, one far off, and one much nearer, in front of it. Distant scenery and a name written on the window pane will do excellently, because neither interferes with the view of the other. Then, sitting a comfortable distance from the nearer object, ascertain with a stop-watch how long it takes to look from one to the other and back again twenty times.

Using one eye, when they have nothing to do but focus, most people take

from 45 to 50 seconds. Using both, the average time required is about 30 or 35 seconds. That it should take less time to perform a two-fold action seems anomalous; but it would appear that under the circumstances accommodation is not effected with any degree of accuracy, for if the near object is a spider's web, and the distant one a few fine wires stretched over white paper so as to be invisible unless they are focussed, the experiment takes longer, and proves very fatiguing, whether performed with one eye or with two.

Used in moderation, with each eye separately and then with both, it is a very valuable kind of ocular gymnastics, that not only relieves the cramped feeling of the eyes after long reading, but may even restore the power of accommodation when it has been prematurely lost by disuse.

All this goes to prove that the connection between convergence and accommodation is habitual rather than automatic.

No notice is taken of the clinical evidence bearing on the question. When the definition of one eye is quickly lost, so that there ceases to be sufficient detail to constitute binocular vision, for days and even weeks the damaged eye gropes about, as a man gropes in the dark with his hands, feeling for the other image, while all the time the sound eye is looking quietly at it. If, by dilating the pupil with atropin, sufficient rays can be got past the opacity to form a definite image, the muscles of the eyeball instantly come into play, and there is a sense of relief. I write positively, because in this matter I write from personal experience. But I can go farther. When, after binocular vision had been in abeyance for five or six years, it was suddenly in a great measure restored, the *habit of convergence had been lost*, and for a day or two it required an effort of the will, so that I had once more the sensation of groping, with the difference that now it was successful. This effect passed off, but while it lasted I realized, as never before, what an important factor of visual sensation binocular vision is. We feel the distances of things as truly with our eyes as we can feel the shapes of them with our fingers. It is a faculty that we have to acquire, and can forget. And we do it in two ways—mainly by the convergence of the optic axes, but partly also by the act of focussing. No amount of theoretical discussion could alter my conviction as to these facts of experience.

It is somewhat to be wondered at that Dr. Witasek should have ignored clinical evidence on so many points. It seems almost as if the physiologist, the psychologist, and the ophthalmologist must take pains to have no dealings with each other. Each might benefit enormously by things the other is familar with. For instance, Dr. Witasek makes no reference to operations for cataract.

The leading case on this subject, which I should be disposed to consider conclusive, is that described in 1728 by William Cheselden in No. 402 of the *Philosophical Transactions of the Royal Society*. It was a boy of thirteen or fourteen who had had cataract in both eyes from infancy, and had no recollection of having ever seen, so that he looked first upon the world in Cheselden's presence. "When he first saw," says the surgeon, "he was so far from making any judgment about distances, that he thought all objects whatever touched his eyes, as he expressed it, as what he felt, did his skin. . . . . He knew not the shape of anything, nor any one thing from another, however different in shape or magnitude. . . . . Having often forgot which was the cat and which the dog, he was ashamed to ask, but catching the cat, which he knew by feeling, he was observed to look at her stedfastly, and then setting her down said, 'So, puss, I shall know you another time!'"

Such a case as this, the unbiassed experience of a person using a faculty for the first time, must, it seems to me, prevail against any amount of theoretical considerations. He experienced the sensations, but did not know what they meant until he had learnt. So far from having an intuitive perception of distance, he did not know that the objects did not touch his eye until he found out by other means. It would probaby be found, could we but discover a means of investigating the matter, that everyone in infancy passes through the same state. At any rate, the subject is one that might well engage the attention of ophthalmologists, who have unrivalled opportunities of observing, and of directing others to observe, cases of recovery from blindness of long duration.

In a few very well-written and forcible pages at the end, the author sums up his own position.

He decides in favour of *Nativismus*, but it is a *Nativismus* modified by *Empiricismus*—that is to say, he believes our space-perception to be a special sense, but does not deny that experience has a share in our conception and knowledge of it.

The book is an interesting and a useful one, but I am convinced that some readers of THE OPHTHALMOSCOPE could add a chapter that would throw new light on the subject. GEORGE J. BURCH, F.R.S.

OXFORD, ENGLAND.

Refraction and Visual Acuity. By KENNETH SCOTT. (With sixteen illustrations and one coloured plate). London: Rebman, Limited. 1911. Price 6s. net.

The author has designed this book to be an aid to the general practitioner who "feels the need of a closer acquaintance with the errors of vision and their correction;" and it is evident that he has been at considerable pains to bring together such a mass of information as might be of use.

The work is well planned, and contains chapters on such subjects as "ordering spectacle frames," "verification of glasses," amongst others, which should be useful. There is also a chapter on "simulated blindness," and another, the last of Part I, on "the medical inspection of the eyes and eyesight of school children." Part II is entirely concerned with the description of the methods of testing the vision of candidates for the public services, Government services, mercantile marine, railways, etc., and then there is an appendix and a complete index.

There are many good points in the book, it is true, but we must confess to a feeling of disappointment, after perusal of the whole work, in regard to the manner in which the excellent design has been carried out.

Too little is said in most places; too much in a few places; and we regret to note the presence of several faults of construction and verbal inaccuracies. It is in such a book as this that the most scrupulous care should be taken to make every point clear, and, if possible, concise.

There are few practitioners who could accept as a definition of meniscus lenses the statement that "these have the surface curved instead of being flat" (page 65), and the explanation of the origin of strabismus convergens, as given on page 85 (after explaining that a greater degree of accommodation is required in hypermetropia than in emmetropia), "accordingly, the relative degree of convergence associated with it is correspondingly so much greater that it is excessive." Taking these as instances, and, unfortunately, they are only a few of many, it must be clear that the work would benefit by

"polishing" in a literary sense. A few verbal inaccuracies are noted which tend to confuse. Such are, for instance (page 125) "$\frac{3}{4}$ of an inch (or $3\frac{1}{2}$ mm.)" and *ibid.* "$2\frac{1}{2}$ inches (or 5·7 mm.)."

In writing of illumination of school rooms (page 122) we find the following, "The minimum of light required is one candle-foot, but under special circumstances this may be profitably increased," etc. One presumes that a "candle-foot" means one candle-power per square foot of floor area, but every one does not know if this be (or be not) correct.

It may seem unduly severe to point out these little matters, but it would surely be to the advantage of a second edition if the text were simplified and purified from faults of construction.

The book is very nicely got up by using good paper and good type.

LESLIE BUCHANAN.

GLASGOW.

NOTES AND ECHOES.

Deaths.

WE regret to announce the death on October 27th last of Dr. Vincenz Fukala, of Vienna, at the age of 65 years. He died literally in harness. Fukala was the originator of the modern operation for high myopia. He published in 1891 his first report, dealing with nineteen eyes, treated by discission of the crystalline lens. Fukala was an enthusiastic therapist.

The death is announced of Professor Emil Emmert, *privat-dozent* of ophthalmology in Bern, at the age of 67 years. He studied with A. v. Graefe, v. Arlt, Donders, and Snellen, and settled in 1870 in Bern. He wrote upon such subjects as refraction, accommodation, and school hygiene.

From America the death is announced of Dr. O. A. Griffin, who died from meningitis at Ann Abor, Mich., on October 28th, aged 39 years. Dr. Griffin was one of the leading ophthalmic surgeons of the Middle West.

Dr. Charles Trow, of Toronto, Canada, died suddenly on October 8th last, aged 55 years. Dr. Trow was associate professor of ophthalmology and otology in the University of Toronto, and a member of the Ontario Medical Council.

* * * *

Appointments.

MR. L. PISANI has been appointed ophthalmic surgeon to the Metropolitan Hospital, London.

Dr. S. Golowin has been appointed ordinary professor of ophthalmology in the University of Moscow.

Dr. M. Marquez has been nominated titular professor of ophthalmology in the University of Madrid.

Dr. E. Mani has been recognised as *privat-dozent* of ophthalmology at Turin, Dr. G. Spoto at Palermo, and Dr. E. Cecchetto at Parma.

* * * *

The Nobel Prize. THE Nobel Prize for Medicine has been awarded this year to Professor Allvar Gullstrand, of Upsala University, for research work in connection with the dioptrics of the eye.

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Dr. J. Hughlings Jackson's estate. DR. J. HUGHLINGS JACKSON'S estate has been proved at £22,637.

* * * *

The Ophthalmological Society. ON November 9th last Sir Jonathan Hutchinson and Professor Landolt were elected honorary members of the Ophthalmological Society of the United Kingdom. A meeting of the Society will be held on May 11th, 1912, at Dublin, on the invitation of the Dublin members of the Society.

* * * *

The Oxford Ophthalmological Congress. THE Oxford Ophthalmological Congress will assemble at Keble College, Oxford, on Wednesday, July 17th, 1912, and the meeting will be held on July 18th and 19th.

* * * *

Berliner Augenklinik. IT is announced that, until further notice, the Berlin Royal *Augenklinik* will be conducted by Professor Hethey, while the teaching duties will be undertaken by Professor R. Greeff at the Berlin Charité.

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Mr. W. A. Brailey. CONGRATULATIONS to Mr. W. A. Brailey, consulting ophthalmic surgeon to Guy's Hospital, London, who has been elected to an honorary Fellowship in Downing College, Cambridge.

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The Midland Ophthalmological Society. AT a well-attended meeting held on November 14th last at the Imperial Hotel, Birmingham, it was resolved to form the Midland Ophthalmological Society, with D. C. Lloyd Owen as President, Henry Eales as treasurer, and J. Jameson Evans and T. Harrison Butler as honorary secretaries. The annual subscription was fixed at the very moderate sum of five shillings. Meetings will be held bi-monthly.

* * * *

Mr. George Cowell.

MR. GEORGE COWELL, consulting surgeon to the Royal Westminster Ophthalmic Hospital, London, has been elected Provost of the Guild of St. Luke for medical men.

* * * *

An "Eye Specialist."

AN optician named R. P. Brehem, who professes to be an "eye specialist," was charged on two counts before the magistrate at Wolmaransstad, Transvaal, on the 28th instant, for contravening the Medical, Dental, and Pharmacy Ordinance. He was convicted and sentenced to a fine of £25 or two months' hard labour on each count.—*Transvaal Medical Journal*, September, 1911.

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